

Indiana University Bloomington

BL417 Geological Sciences Phase 2 F100 IGWS East
(F100) Lab Renovations
IU 20250361

ADDENDUM NO. 3
14217

BL417: 1001 E. 10th Street
Bloomington, IN 47405

25 March 2026

ARTEKNA

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321 East New York Street, Indianapolis, Indiana 46204
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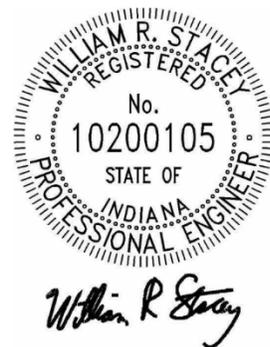
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**SECTION 000105
CERTIFICATIONS PAGE**

ARCHITECTURAL CERTIFIED BY:



ELECTRICAL CERTIFIED BY:



MECHANICAL, PLUMBING, FIRE PROTECTION CERTIFIED BY:



END OF SECTION

25 MARCH 2026

This addendum forms a part of the Contract Documents and modifies the Project Manual and/or Drawings dated 3 March 2026 on the Cover Sheet.

GENERAL NOTES:

1. Refer to attached Addendum No. 3 information from CMTA.
2. Pre-Bid Questions and Answers
 - Q.** Republic Clearview lockers are ONLY available in 6-tier. (72"H) We need to know if they are recessed or on legs with a slope top! The drawings show a 5 x 10 elevation (50 lockers.)
 - A.** Six-tier lockers are acceptable. Lockers are not recessed. Provide legs for the lockers. A sloped top is not required.

Attachments:

1. CMTA - Addendum #3

END

Addendum #3

RE: Indiana University
BL417 GEOLOGICAL
SCIENCES - FACULTY
100 - GEOLOGICAL
SCIENCES

OWNER: The Trustees of
Indiana University
Bloomington, Indiana

PROJECT No. 20250361

CMTA PROJECT IUGE25

DATE: March 24, 2026

ISSUED BY: CMTA Inc.
9225 Priority Way West Drive, Suite 130
Indianapolis, IN 46240

TO: Indiana University

This Addendum modifies the Bidding Documents, and will become part of the Contract Documents. Acknowledge receipt of this Addendum on Bid Form. Failure to do so may subject the Bidder to disqualification.

GENERAL CLARIFICATIONS:

None.

CHANGES TO BIDDING REQUIREMENTS:

None.

CHANGES TO SPECIFICATIONS:

None.

CHANGES TO DRAWINGS:

1. Sheet P202 – SECOND FLOOR PLUMBING PLANS
 - a. Modified plan note.
2. Sheet H101 – FIRST FLOOR HVAC DEMOLITION PLANS
 - a. Added ductless split system condensing unit and refrigerant piping to be removed.
 - b. Clarified notes on VAV box piping and valve removal. In general, if a VAV box is to be relocated, the hot water temperature control valve needs to be relocated with that box. The other shutoff valves, strainer, flow control valve, etc can remain if there is a replacement box being installed in that same location, or contractor can relocate the entire valve package with the VAV box (contractor discretion). If there is a new VAV box in a new location, then contractor is to provide a new set of valves and install the new control valve from Siemens. This is typical for all floors. See the VAV box schedule for additional information on which boxes are new and which ones are relocated. Contractor may also re-use existing valve packages that were removed from a VAV box that is shown to be removed with no replacement shown near its existing location, as long as they are sized appropriately.
3. Sheets H102, 104, 104 – HVAC FLOOR PLANS
 - a. Clarified notes on VAV box piping and valve removal. See note above.
4. Sheet H201 – FIRST FLOOR HVAC PLANS
 - a. Added remote alarm for oxygen sensor in Lab Support 1006.
 - b. Added cabinet unit heater CUH-4 in dock area.
 - c. Cleaned up plan notes.
5. Sheet H901 – HVAC SCHEDULES
 - a. Added cabinet unit heater schedule.
6. Added temperature controls drawings from Siemens. Contractor shall include all installation of devices, wiring, etc of temperature controls with their bid. Siemens parts and programming are owner provided. See specifications for more details. Coordinate installation requirements with Siemens prior to bid.
7. Sheet E100 – ELECTRICAL LEGEND & GENERAL NOTES
 - a. Equipment schedule added to sheet.
8. Sheet E202 – SECOND FLOOR - EAST WING - ELECTRICAL PLANS
 - a. Revised scope for Unistrut mounting system.
 - b. Revised tagged notes #15 and #E22.
9. Sheet E300 – PARTIAL INTERCONNECTION PLANS - BASEMENT & FIRST FLOOR
 - a. Added connection for cabinet heater.
 - b. Added tagged note #E31.

PLAN NOTES 25 - P202

- 1 PROVIDE PRESSURE REGULATOR, PRESSURE GAUGE, AND BALL VALVE ON ALL BOTTLED GAS LINES.
- 2 1/2" LAB GAS CONNECTIONS TO SERVICE EQUIPMENT. COORDINATE ALL EQUIPMENT CONNECTION WITH EQUIPMENT DRAWINGS AND OWNER PRIOR TO CONSTRUCTION.
- 3 ROUTE COMPRESSED AIR PIPING IN CEILING ON UNISTRUT SYSTEM. CONNECT COMPRESSED AIR PIPING TO CEILING MOUNTED PANEL. REFER TO 'M' SERIES DRAWINGS FOR MORE INFORMATION. UNISTRUT SYSTEM TO BE INSTALLED BY ELECTRICAL CONTRACTOR. MECHANICAL CONTRACTOR TO ROUTE AND INSTALL COMPRESSED AIR PIPING.
- 4 ROUTE COMPRESSED AIR PIPING DOWN COLUMN ENCLOSURE. SECURE TO WALL. PROVIDE QUICK CONNECT FITTING SIMILAR TO CONNECTIONS ABOVE TABLES. COMPRESSED AIR CONNECTION SHALL BE INSTALLED AT 5' F.F.E.
- 5 CONNECT NEW HW PIPING TO EXISTING HW PIPING IN CORRIDOR.
- 6 EXISTING HW, LCW, LA, DW, APW, AND APV DOWN CORRIDOR. FIELD VERIFY EXISTING PIPE LOCATIONS AND ELEVATIONS PRIOR TO CONSTRUCTION.
- 7 CONNECT NEW APV, LA, AND LW PIPING TO EXISTING PIPING DOWNSTREAM OF VALVE.
- 8 CONNECT NEW LAB VACUUM PIPING TO NEW LAB VACUUM PIPING LOCATED IN CHASE.
- 9 EXISTING DOMESTIC WATER PIPING CAPPED TO REMAIN NOT RELATED TO PROJECT SCOPE.
- 10 DASHED LINE INDICATES AREA OF FIRE SPRINKLER SYSTEM TO BE MODIFIED TO ACCOMMODATE THE NEW LAYOUT INCLUDING NEW AND EXISTING UTILITIES ABOVE CEILING. COORDINATE SPRINKLER INSTALL WITH ALL TRADES PRIOR TO INSTALL. ALL SPRINKLER HEADS SHALL MATCH EXISTING HEADS WITHIN LAB SPACES. COORDINATE SHUT DOWN WITH OWNER.
- 11 RED SOLID LINE INDICATES LAB VACUUM PIPING ASSOCIATED WITH ALTERNATE #1. IF ALTERNATE #1 IS NOT CONSTRUCTED CAP 3/4" LAB VACUUM PIPE 1" DOWNSTREAM OF CONNECTION TO BIOSAFETY CABINET.
- 12 IF ALTERNATE #1 IS NOT SELECTED, PROVIDE AND INSTALL VALVE AND CAP ON TEE TO SERVE ALTERNATE #1 SCOPE IN FUTURE.
- 13 CONNECT NEW LAB WASTE PIPING TO EXISTING LAB WASTE PIPING IN CHASE.

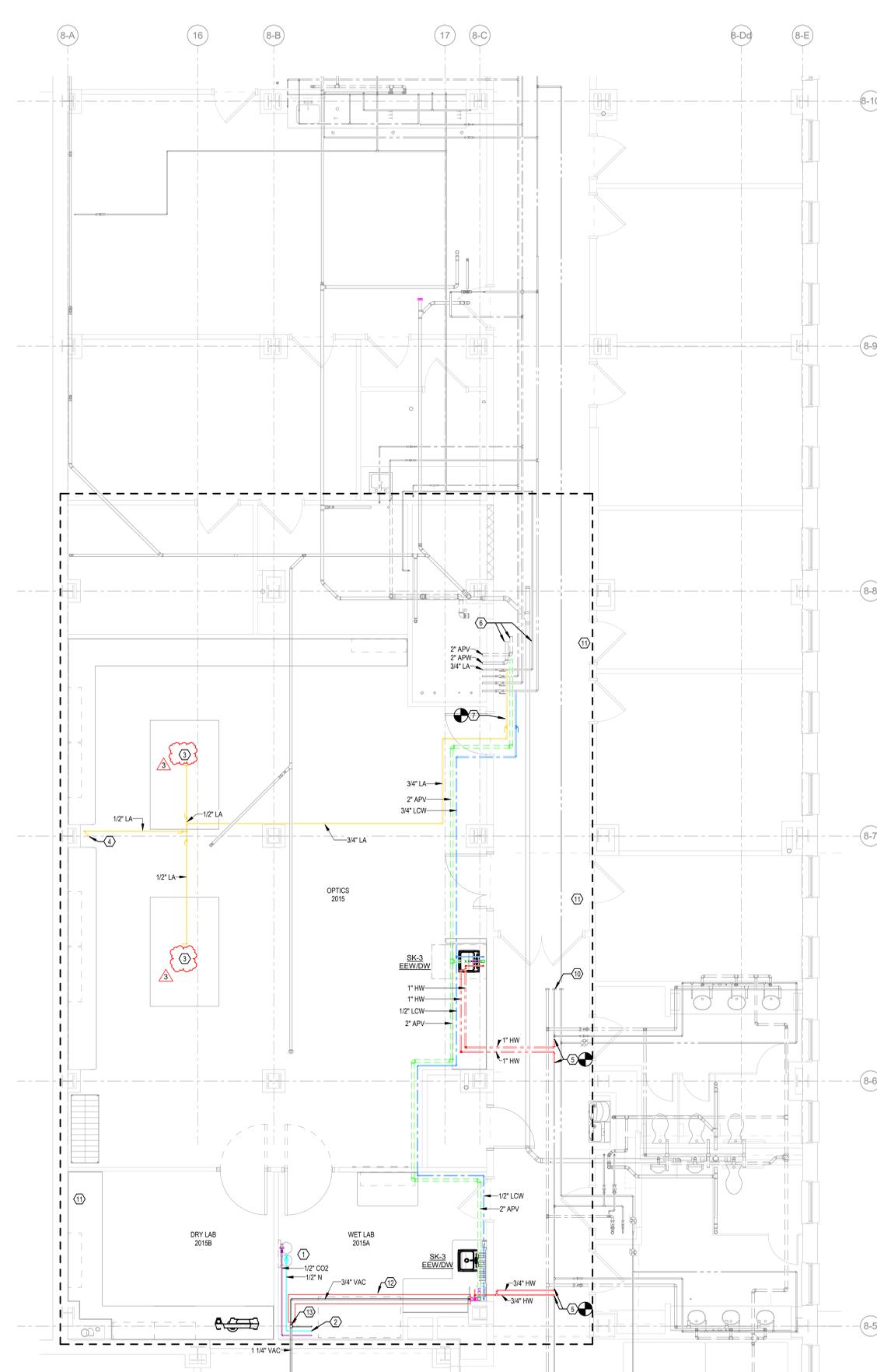
CONTRACTOR SHALL COORDINATE WITH ALL TRADES NEW AND EXISTING PRIOR TO CONSTRUCTION.

CONTRACTOR TO NOTIFY OWNER MINIMUM 14 DAYS PRIOR TO SHUTDOWN OF ANY UTILITIES.

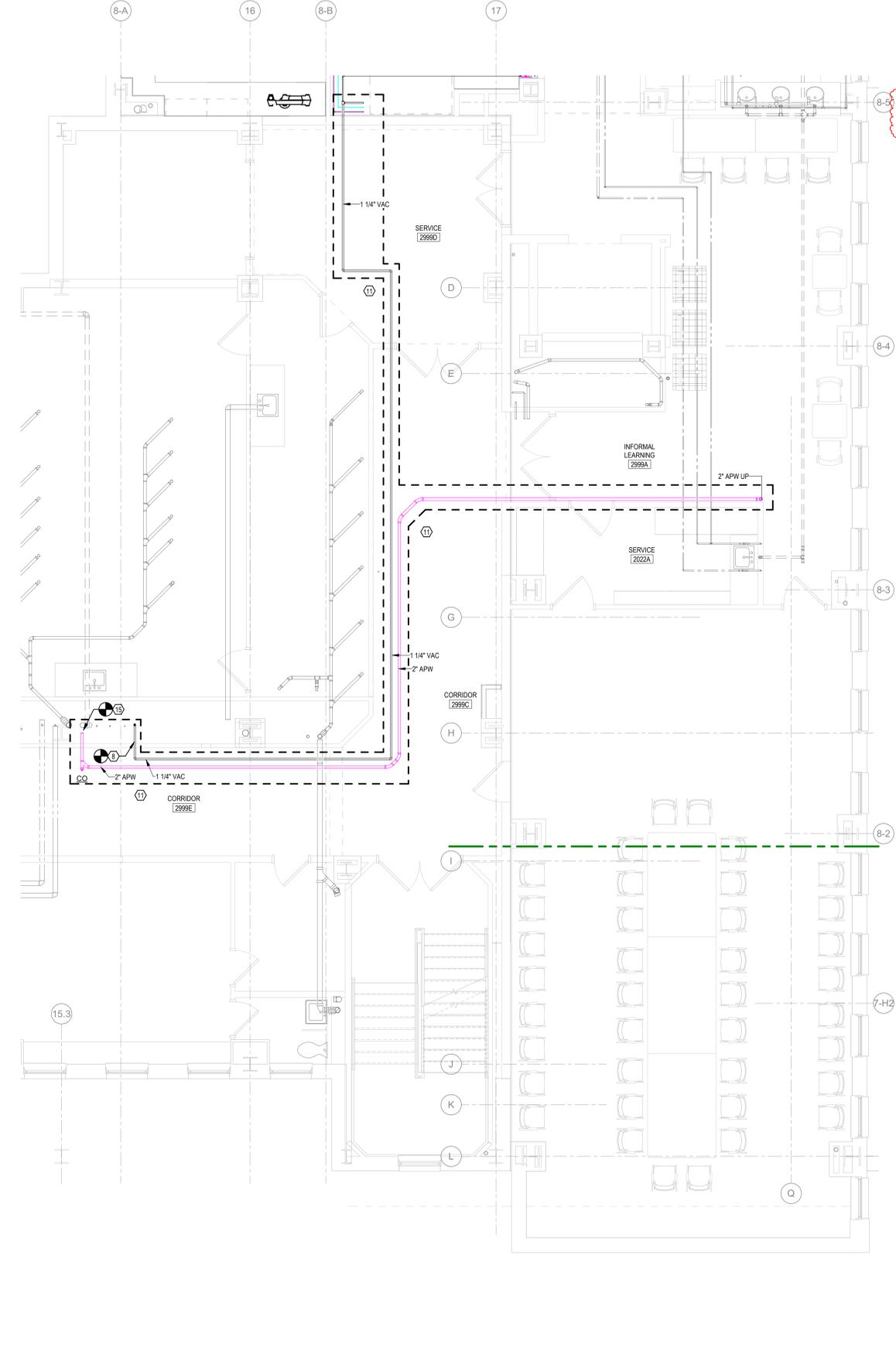
PLUMBING CONTRACTOR TO CORE DRILL THROUGH EXISTING MASONRY WALLS PATCH AND REPAIR AS NECESSARY.

DATE: 03 MAR 2024
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 DRAWN BY: [Signature]
 CHECKED BY: [Signature]
 PROJECT: BL 417 GEOLGY - FACILITY 100
 REVISIONS: 3 Addendum 3
 03/24/2024

WILLIAM R. SKACKY
 No. 02000105
 STATE OF INDIANA
 LICENSED PROFESSIONAL ENGINEER
 William R. Skacky
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1 NORTH SECOND FLOOR PLUMBING
 SCALE: 1/4" = 1'-0"



2 SOUTH SECOND FLOOR PLUMBING
 SCALE: 1/4" = 1'-0"

PLUMBING FIXTURES SCHEDULE

TAG	DESCRIPTION	FIXTURE MANUFACTURER	FIXTURE MODEL	TRIM / FAUCET MANUFACTURER	TRIM / FAUCET MODEL	CONNECTIONS					NOTES	
						CW	HW	DW	TW	WASTE/DRAIN		VENT
ES/EEW-1	BARRIER FREE SAFETY SHOWER / EYE WASH	BRADLEY	S19314BF	-	-	1"	1"	-	1-1/4"	2"	2"	PROVIDE POINT OF USE MIXING VALVE SIMILAR TO NAVIGATOR S19-2150 EFX20. PROVIDE OPTIONAL BARRIER FREE PULL ROD.
LAV-1 EEW	LAB LAVATORY W/ EEW	KOHLER	K-2868	CHICAGO FAUCET	8452-ABCP	1/2"	1/2"	-	3/4"	2"	2"	PROVIDE POINT OF USE MIXING VALVE SIMILAR TO NAVIGATOR S19-2000 EFX8.
SK-1 DW	LAB SINK W/ DW WATER	BY OTHERS	BY OTHERS	BY OTHERS	BY OTHERS	1/2"	1/2"	1/2"	-	2"	2"	PROVIDE POINT OF USE MIXING VALVE SIMILAR TO NAVIGATOR S19-2000 EFX8.
SK-2 EEW	LAB SINK W/ EEW	BY OTHERS	BY OTHERS	BY OTHERS	BY OTHERS	1/2"	1/2"	-	3/4"	2"	2"	PROVIDE POINT OF USE MIXING VALVE SIMILAR TO NAVIGATOR S19-2000 EFX8.
SK-3 EEW/DW	LAB SINK W/ EEW AND DW	BY OTHERS	BY OTHERS	BY OTHERS	BY OTHERS	1/2"	1/2"	1/2"	3/4"	2"	2"	PROVIDE POINT OF USE MIXING VALVE SIMILAR TO NAVIGATOR S19-2000 EFX8.

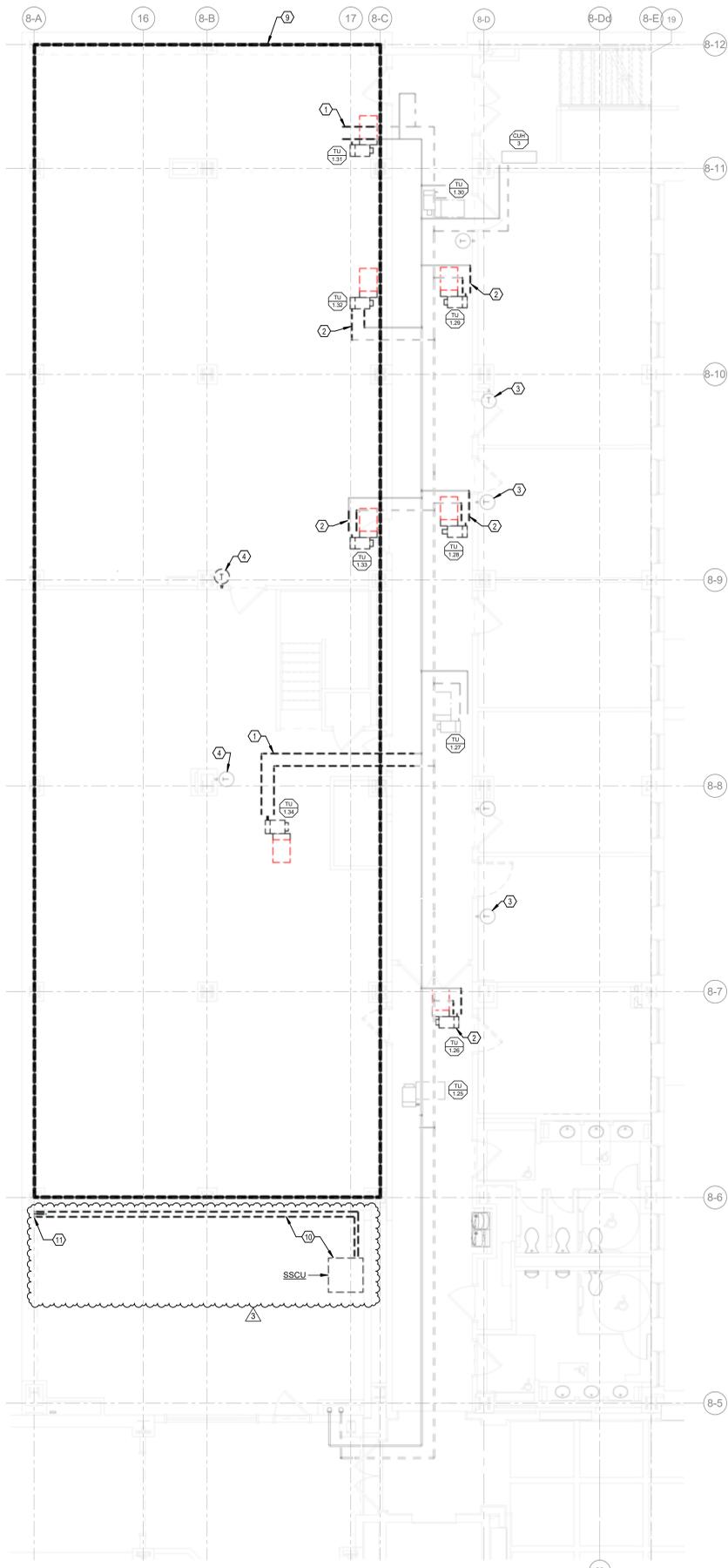
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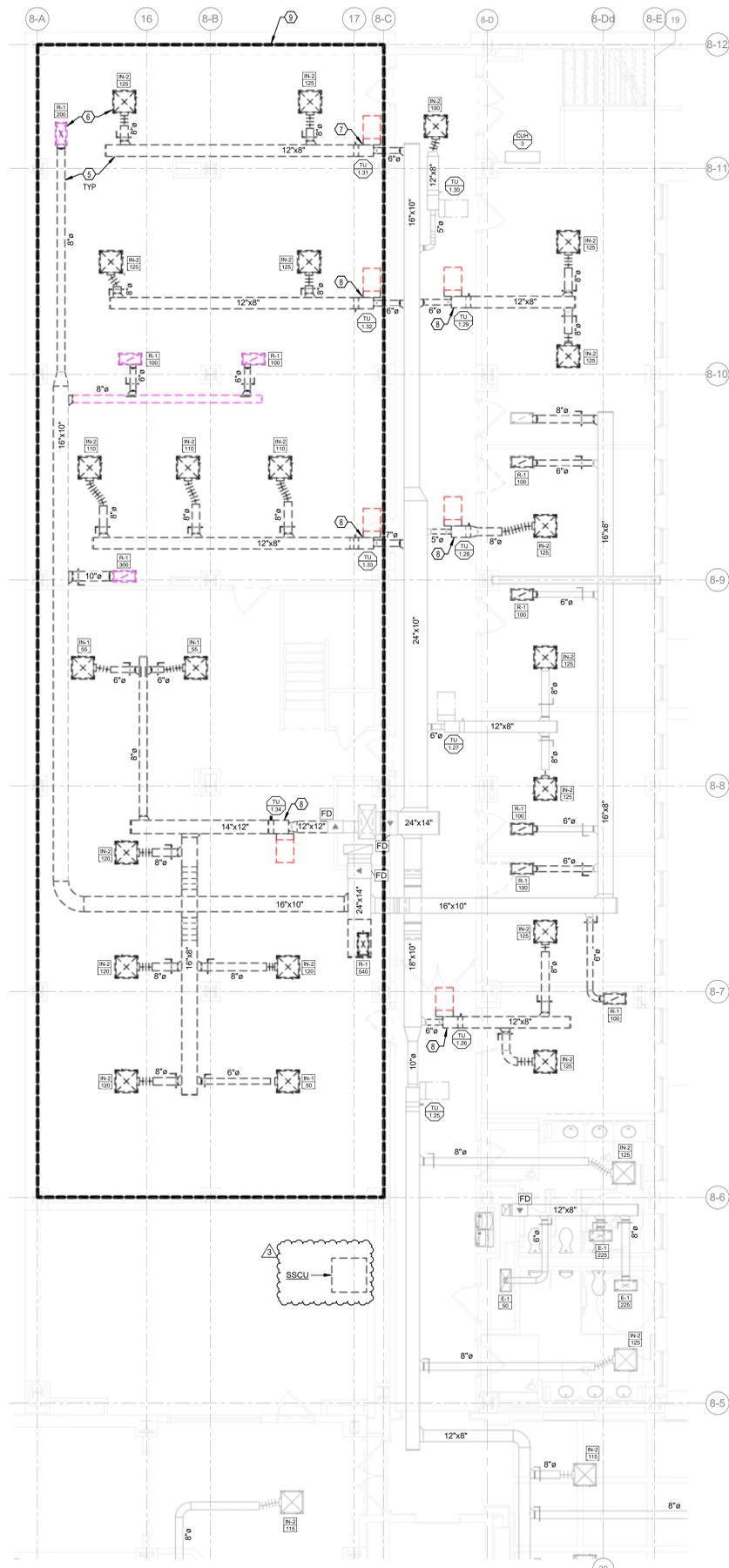


SECOND FLOOR PLUMBING PLANS P202

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2 FIRST FLOOR NORTH HVAC PIPING DEMOLITION PLAN
SCALE: 3/16" = 1'-0"

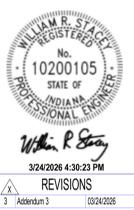


1 FIRST FLOOR NORTH HVAC DEMOLITION PLAN
SCALE: 3/16" = 1'-0"

PLAN NOTES - H101

- 1 REMOVE EXISTING HOT WATER PIPING BACK TO MAIN AND CAP. SAVE VALVE PACKAGES FOR REINSTALLATION.
- 2 REMOVE EXISTING HOT WATER PIPING CONNECTIONS TO EXISTING VAV BOX TO BE REMOVED OR RELOCATED. PREPARE FOR CONNECTION TO NEW VAV BOX. EXISTING VALVE PACKAGES MAY REMAIN. RELOCATE EXISTING HOT WATER TEMPERATURE CONTROL VALVE WITH THE BOX TO ITS NEW LOCATION - COORDINATE WITH SIEMENS.
- 3 EXISTING THERMOSTAT TO REMAIN. RECONNECT TO EXISTING RELOCATED VAV BOX.
- 4 EXISTING THERMOSTAT TO REMAIN. CONNECT TO NEW REPLACEMENT VAV BOXES.
- 5 REMOVE EXISTING DUCT SHOWN DASHED (TYPICAL).
- 6 REMOVE EXISTING DIFFUSER OR GRILLE SHOWN DASHED (TYPICAL).
- 7 REMOVE EXISTING VAV BOX COMPLETE. SAVE CONTROLLER FOR REINSTALLATION.
- 8 REMOVE EXISTING VAV BOX AND DUCT SHOWN DASHED. SAVE FOR REINSTALLATION.
- 9 ALL WORK WITH ROOMS 1006 AND 1011 SHALL BE BID AS PART OF ALTERNATE #1.
- 10 REMOVE EXISTING DUCTLESS SPLIT SYSTEM CONDENSING UNIT AND ASSOCIATED REFRIGERANT PIPING COMPLETE.
- 11 PATCH HOLES THROUGH FLOOR AND PROVIDE ALUMINUM PLATE CAP ON THE EXTERIOR UNDERSIDE. SEAL WEATHERTIGHT.

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CHECKED BY: [Name]
PROJECT: H101

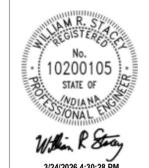


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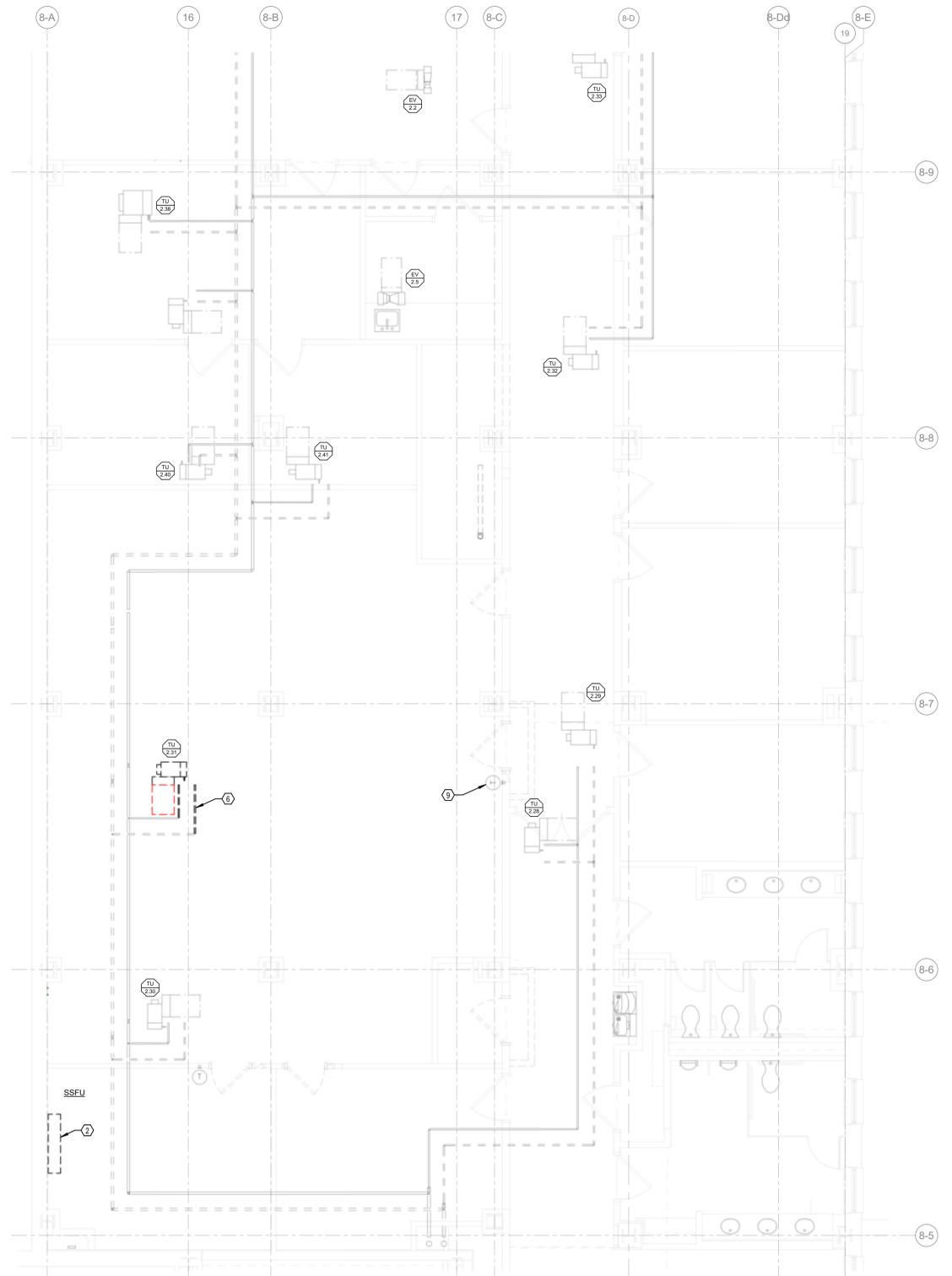
FIRST FLOOR
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DEMOLITION
PLANS
H101



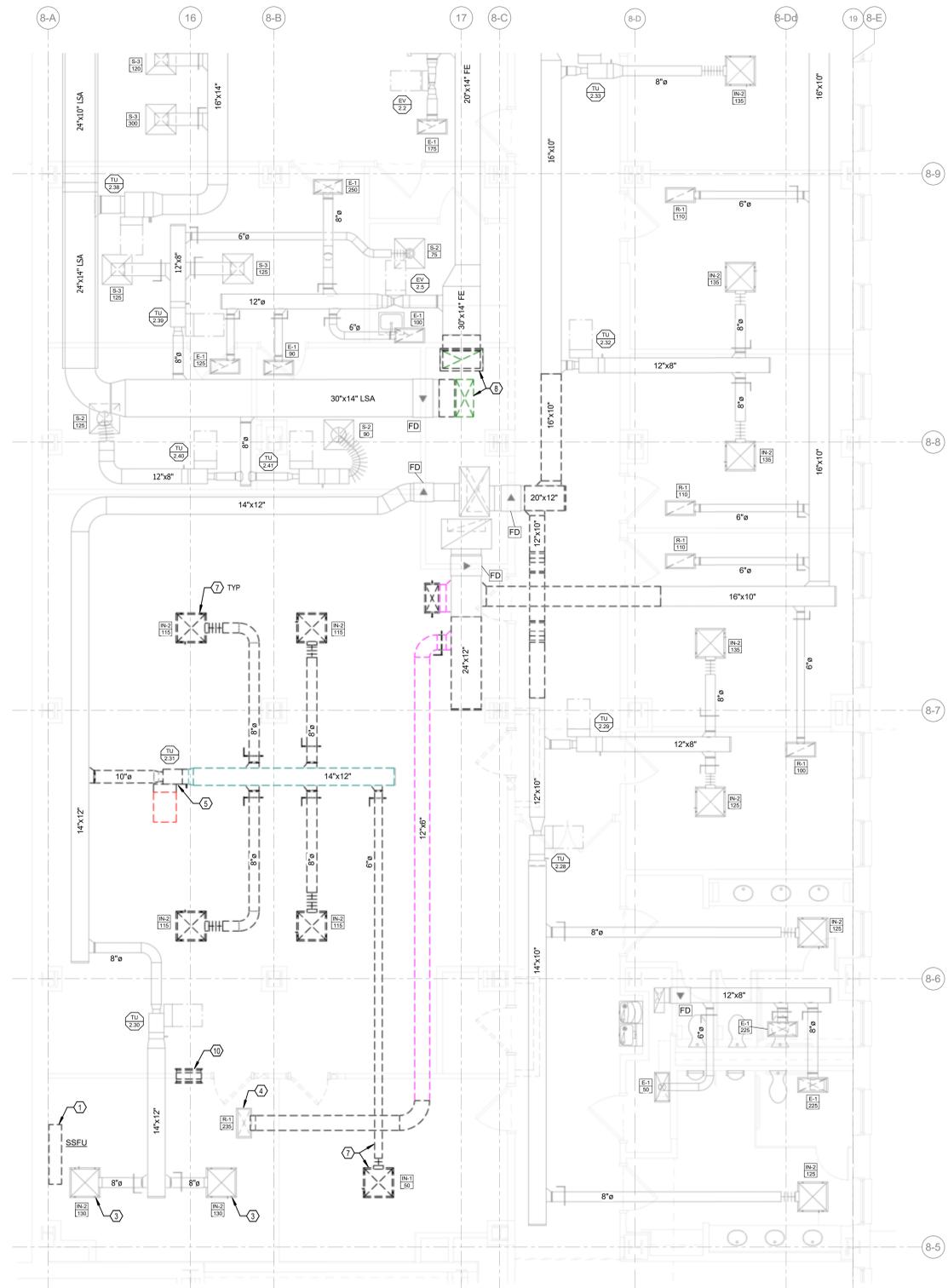
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PLAN NOTES - H102

- 1 REMOVE EXISTING DUCTLESS SPLIT SYSTEM COMPLETE, INCLUDING FAN COIL UNIT SHOWN HERE AND CONDENSING UNIT ON DOCK AREA BELOW. REMOVE ALL CONTROLS. COORDINATE WITH G.C.
- 2 REMOVE ALL REFRIGERANT AND CONDENSATE PIPING COMPLETE. PATCH FLOOR OPENINGS; COORDINATE WITH G.C.
- 3 EXISTING DIFFUSER TO REMAIN. BALANCE TO NEW AIRFLOW SHOWN.
- 4 EXISTING RETURN GRILLE TO REMAIN. BALANCE TO NEW AIRFLOW SHOWN.
- 5 REMOVE VAV BOX AND UPSTREAM BRANCH DUCT COMPLETE. SAVE FOR REINSTALLATION.
- 6 REMOVE EXISTING HOT WATER PIPING CONNECTIONS TO EXISTING VAV BOX TO BE REMOVED OR RELOCATED. PREPARE FOR CONNECTION TO NEW VAV BOX. EXISTING VALVE PACKAGES MAY REMAIN. RELOCATE EXISTING HOT WATER TEMPERATURE CONTROL VALVE WITH THE BOX TO ITS NEW LOCATION - COORDINATE WITH SIEMENS.
- 7 REMOVE EXISTING DIFFUSER AND ASSOCIATED DUCT SHOWN DASHED. SAVE DIFFUSER FOR RELOCATION.
- 8 REMOVE EXISTING LAB SUPPLY AND EXHAUST RISERS UP TO THIRD FLOOR CEILING AREA. PREPARE FOR INSTALLATION OF LARGER RISERS AND RISERS EXTENDING DOWN THROUGH FLOOR.
- 9 EXISTING THERMOSTAT TO REMAIN. DISCONNECT WIRING FROM EXISTING VAV BOX AND PREPARE FOR RECONNECTION TO NEW REPLACEMENT VAV BOX.
- 10 REMOVE TRANSFER GRILLES AND DUCT. PATCH WALL TO MATCH EXISTING.



2 SECOND FLOOR NORTH HVAC PIPING DEMOLITION PLAN
 SCALE: 1/4" = 1'-0"



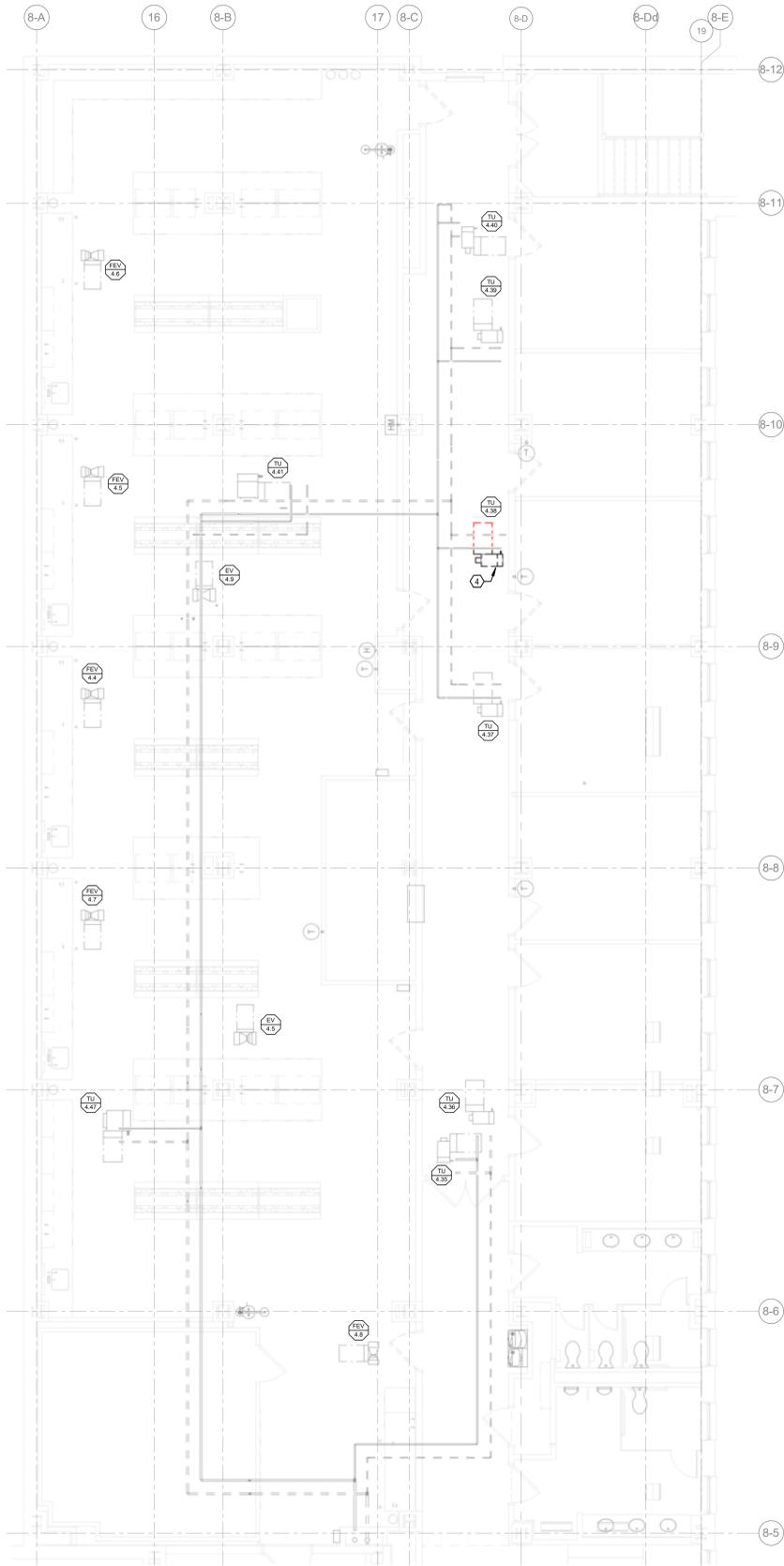
1 SECOND FLOOR NORTH HVAC DEMOLITION PLAN
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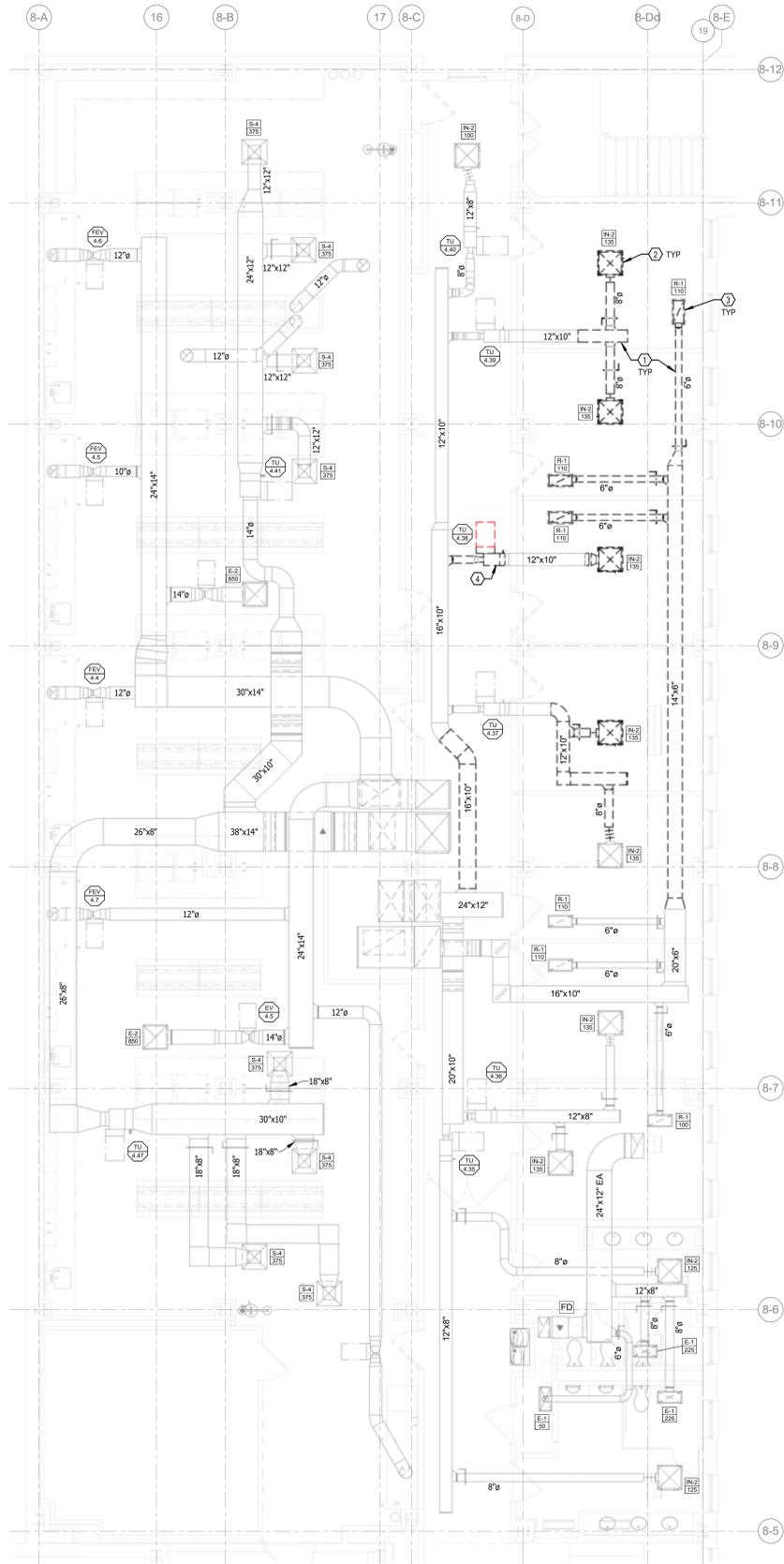
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SECOND FLOOR NORTH
 HVAC DEMOLITION
 PLANS
H102



2 FOURTH FLOOR NORTH HVAC PIPING DEMOLITION PLAN
SCALE: 3/16" = 1'-0"



1 FOURTH FLOOR NORTH HVAC DEMOLITION PLAN
SCALE: 3/16" = 1'-0"

PLAN NOTES - H104

- 1 REMOVE EXISTING DUCT BACK TO POINT SHOWN.
- 2 REMOVE EXISTING DIFFUSERS AND SAVE FOR REINSTALLATION.
- 3 REMOVE EXISTING PICTURE GRILES AND SAVE FOR REINSTALLATION.
- 4 REMOVE EXISTING VAV BOX AND DUCT SHOWN DASHED. SAVE VAV BOX FOR RELOCATION. REMOVE EXISTING HOT WATER PIPING CONNECTIONS TO EXISTING VAV BOX TO BE REMOVED OR RELOCATED. PREPARE FOR CONNECTION TO NEW VAV BOX. EXISTING VALVE PACKAGES MAY REMAIN. RELOCATE EXISTING HOT WATER TEMPERATURE CONTROL VALVE WITH THE BOX TO ITS NEW LOCATION - COORDINATE WITH SIEMENS.

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 PROJECT: [Name]
 SHEET: 14/13



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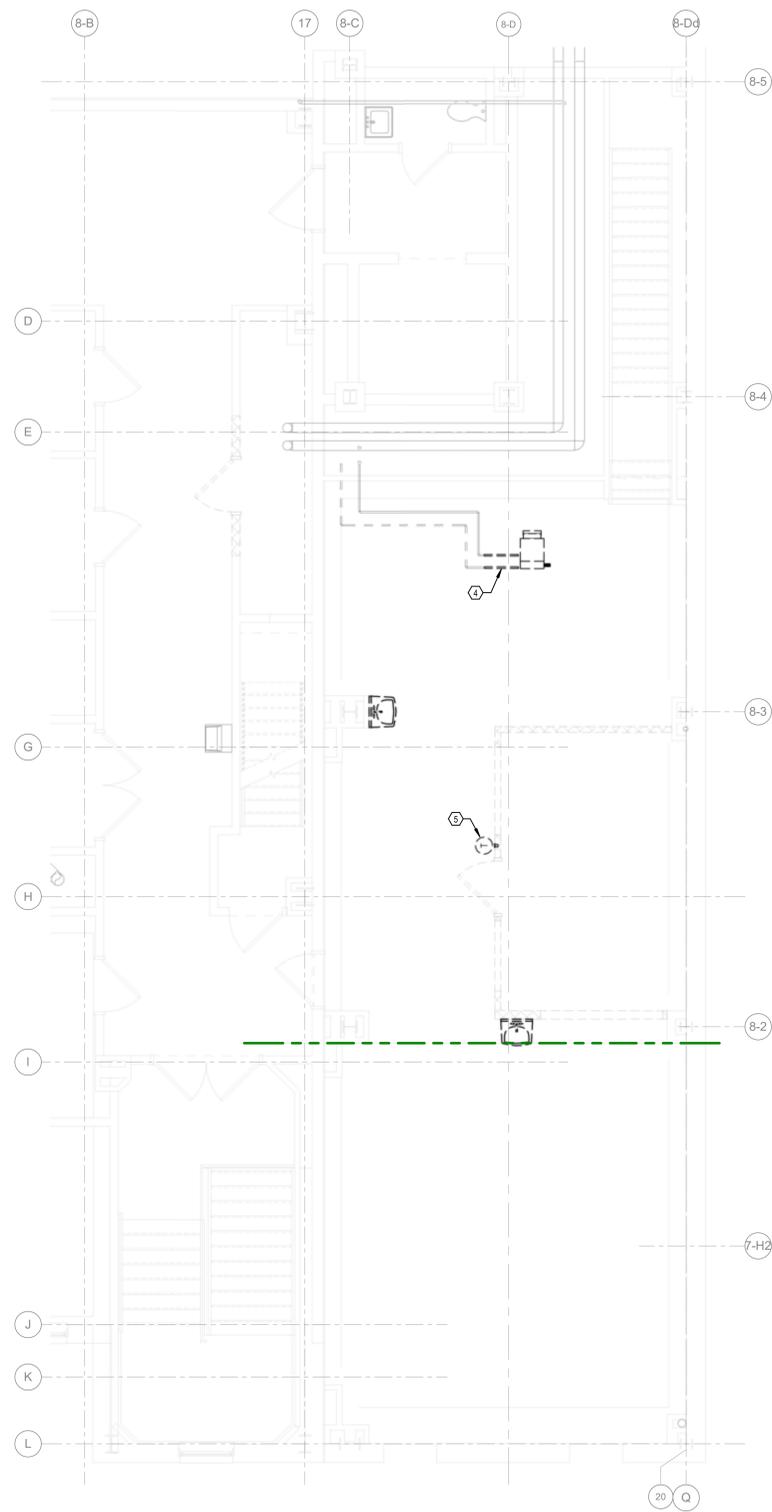
FOURTH FLOOR
 NORTH HVAC
 DEMOLITION
 PLANS
H104



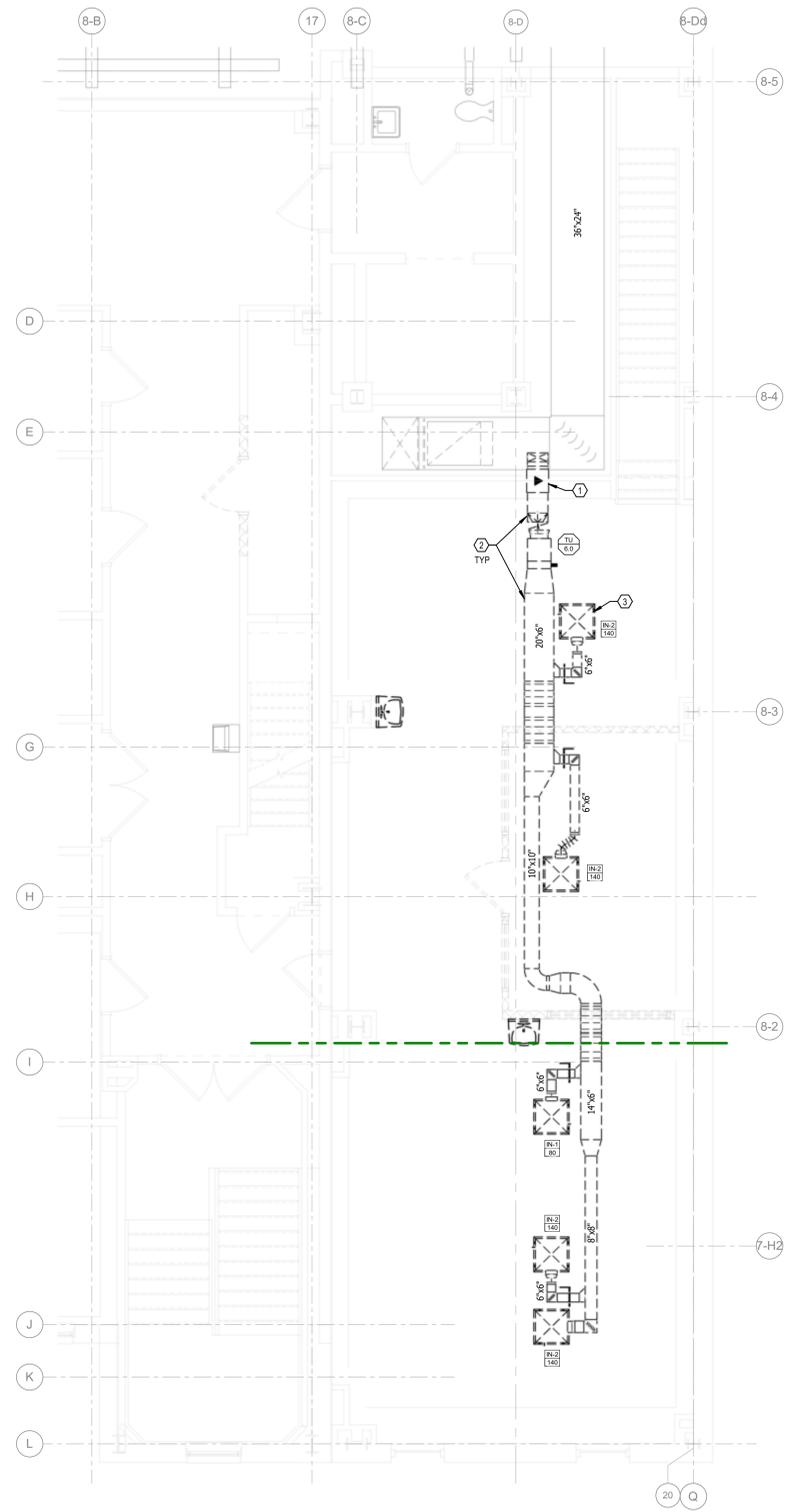
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PLAN NOTES - H107

- 1 REMOVE EXISTING FIRE DAMPER. PREPARE FOR NEW LARGER FIRE DAMPER IN SAME LOCATION.
- 2 SAVE VAV BOX FOR REINSTALLATION.
- 3 REMOVE EXISTING DUCT BACK TO POINT SHOWN.
- 4 REMOVE EXISTING DEFLECTERS AND SAVE FOR REINSTALLATION.
- 5 REMOVE EXISTING VAV BOX. SAVE VAV BOX FOR RELOCATION. REMOVE EXISTING HOT WATER PIPING CONNECTIONS TO EXISTING VAV BOX TO BE REMOVED OR RELOCATED. PREPARE FOR CONNECTION TO NEW VAV BOX. EXISTING VALVE PACKAGES MAY REMAIN. RELOCATE EXISTING HOT WATER TEMPERATURE CONTROL VALVE WITH THE BOX TO ITS NEW LOCATION - COORDINATE WITH SIEMENS.
- 6 REMOVE EXISTING THERMOSTAT AND ASSOCIATED WIRING. SAVE THERMOSTAT FOR REINSTALLATION.



2 SIXTH FLOOR SOUTHEAST HVAC PIPING DEMOLITION PLAN
 SCALE: 1/4" = 1'-0"



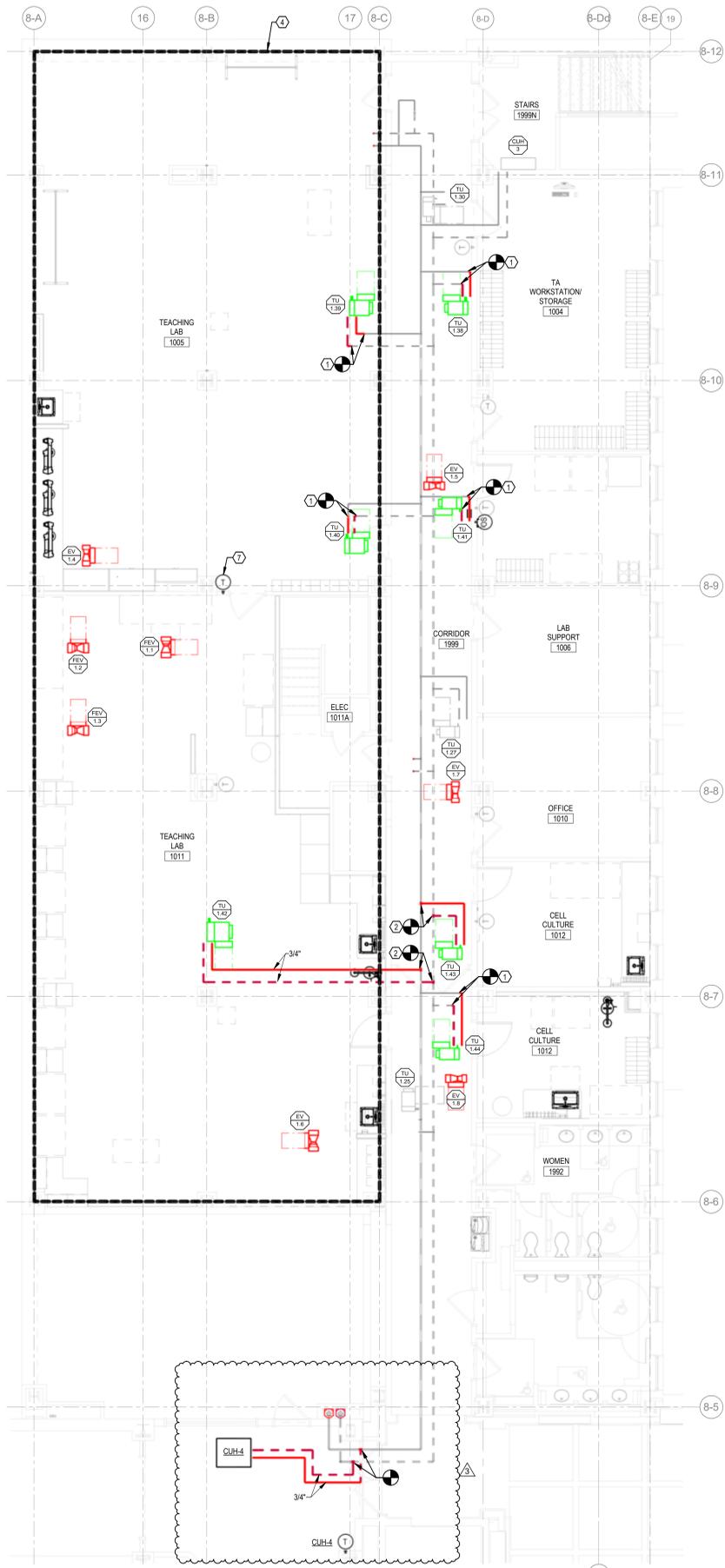
1 SIXTH FLOOR SOUTHEAST HVAC DEMOLITION PLAN
 SCALE: 1/4" = 1'-0"

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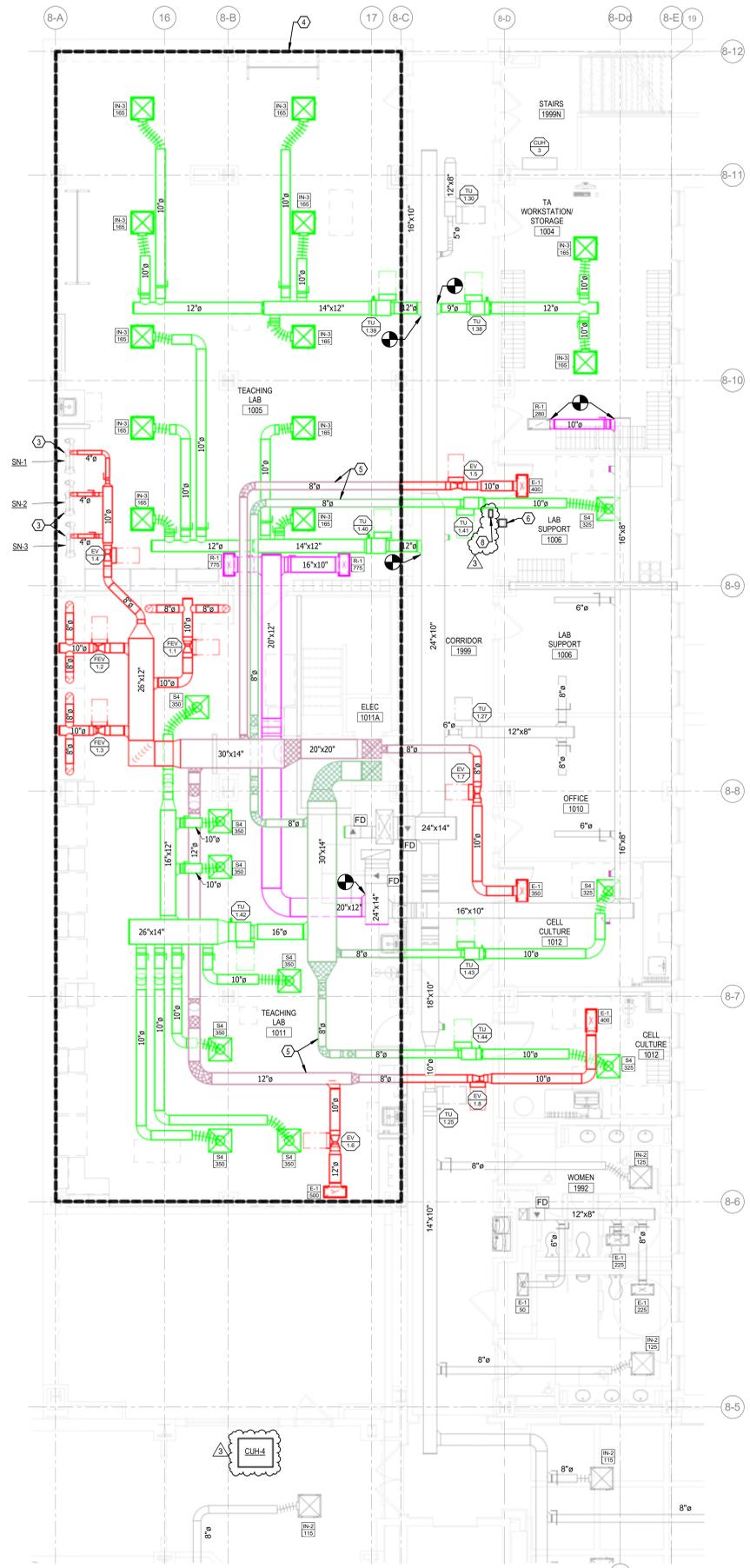
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**SIXTH FLOOR
 SOUTHEAST
 HVAC
 DEMOLITION
 PLANS
 H107**



2 FIRST FLOOR NORTH HVAC PIPING PLAN
SCALE: 3/16" = 1'-0"



1 FIRST FLOOR NORTH HVAC PLAN
SCALE: 3/16" = 1'-0"

PLAN NOTES - H201

- 1. CONNECT EXISTING 3" HOT WATER SUPPLY AND RETURN TO NEW OR RELOCATED VAV BOX. REINSTALL EXISTING HOT WATER TEMPERATURE CONTROL VALVE ASSOCIATED WITH THE RELOCATED VAV BOX.
- 2. CONNECT NEW 3/4" HOT WATER SUPPLY AND RETURN FROM EXISTING MAINS TO NEW VAV BOX. ROUTE 3/4" EXHAUST DUCT DOWN THROUGH CEILING TO NEW SNORKEL. PROVIDE AND INSTALL NEW EXHAUST SNORKEL MOUNTED ON WALL. PROVIDE ESCUTCHEON RING AROUND DUCT THROUGH CEILING.
- 3. ALL WORK WITH ROOMS 1005 AND 1011 SHALL BE BID AS PART OF ALTERNATE #1.
- 4. DUCT SHOWN IN DARK RED AND DARK GREEN THROUGH ROOMS 1005 AND 1011 SHALL BE PART OF BASE BID IN THIS AREA TO GET SERVICES TO OTHER ROOMS ON THIS FLOOR THAT ARE PART OF THE BASE BID. FIELD VERIFY ROUTE AROUND EXISTING DUCT TO REMAIN. AS PART OF ALTERNATE #1. PROVIDE EVERYTHING ELSE SHOWN IN THESE TWO ROOMS.
- 5. PROVIDE WALL MOUNTED OXYGEN SENSOR WITH LOCAL ALARM IN THIS LOCATION. EXISTING THERMOSTAT TO REMAIN. REWIRE/REPROGRAM AS REQUIRED TO CONTROL THE TWO VAV BOXES FOR THIS SPACE.
- 6. REMOTE ALARM FOR OXYGEN SENSOR IN ROOM 1006. PROVIDE SIGN AT ALARM THAT STATES "OXYGEN DEFICIENCY ALARM. DO NOT ENTER ROOM WHEN ACTIVATED."

WILLIAM R. STACY
REGISTERED PROFESSIONAL ENGINEER
No. 10200105
STATE OF INDIANA
3/24/2026 4:30:47 PM
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FIRST FLOOR
NORTH HVAC
PLANS
H201

SUPPLY AND EXHAUST AIR TERMINAL UNITS

ROOM SERVED				SUPPLY AIR TERMINAL UNITS														EXHAUST AIR TERMINAL UNITS								
NUMBER	NAME	AIR CHANGES AT MIN AIRFLOW	OFFSET (CFM - IN, + OUT)	SOURCE AHU'S	MARK	MANUFACTURER AND MODEL	INLET SIZE	MAX CLG CFM	MIN CFM	MAX HTG CFM	GPM	MBH	EWT	LWT	MAX WPD	EAT	LAT	SOURCE EFS	MARK	MANUFACTURER AND MODEL	INLET SIZE	MAX CFM	MIN CFM	SERVICE	MIN SASH FPM (18" HEIGHT MAX)	
1004	TA WORKSTATION	N/A	50	AHU-3	TU-1.38	NEW OR EXISTING TU-1.34	9"	330	130	330	1.1	16.0	140	110	10'	50	95	-	-	-	-	-	-	-	-	-
1005	TEACHING LAB	6	100	AHU-3	TU-1.39	EXISTING TU-6.0	12"	825	620	725	2.3	35.2	140	110	10'	50	95	LEF-1A,1B,1C	EV-1.4	PRICE RDV	8"	225	225	SNORKELS	-	
1006	LAB SUPPORT	6	-75	AHU-4	TU-1.40	NEW PRICE SDV	12"	825	620	725	2.3	35.2	140	110	10'	50	95	LEF-1A,1B,1C	EV-1.5	PRICE RDV	8"	400	230	GENERAL EXH	-	
1011	TEACHING LAB	6	-150	AHU-4	TU-1.42	NEW PRICE SDV	16"	2430	1250	1250	3.6	54.0	140	110	10'	55	95	LEF-1A,1B,1C	FEV-1.1	SIEMENS LGEQ	10"	860	300	8" FUME HOOD	80	
1012	CELL CULTURE	6	-75	AHU-4	TU-1.43	EXISTING TU-3.26	8"	275	150	200	0.6	8.6	140	110	10'	55	95	LEF-1A,1B,1C	FEV-1.2	SIEMENS LGEQ	10"	860	300	8" FUME HOOD	80	
1014	LAB SUPPORT	6	-75	AHU-4	TU-1.44	EXISTING TU-3.28	8"	325	155	200	0.6	8.6	140	110	10'	55	95	LEF-1A,1B,1C	FEV-1.3	SIEMENS LGEQ	10"	860	300	8" FUME HOOD	80	
2015	OPTICS	6	-150	AHU-4	TU-2.42	NEW PRICE SDV	14"	1500	1000	1000	3.2	48.6	140	110	10'	50	95	LEF-1A,1B,1C	EV-2.9	PRICE RDV	14"	1650	1150	GENERAL EXH	-	
2015A	WET LAB	6	-50	AHU-4	TU-2.43	NEW OR EXISTING TU-1.33	7"	225	160	160	0.5	6.9	140	110	10'	50	95	LEF-1A,1B,1C	EV-2.7	PRICE RDV	8"	275	210	GENERAL EXH	-	
2015B	DRY LAB	6	-50	AHU-3	TU-2.30	EXISTING	8"	260	165	200	0.6	9.7	140	110	10'	50	95	LEF-1A,1B,1C	EV-2.8	PRICE RDV	5"	75	75	SNORKEL	-	
3021	ROBOTICS LAB	N/A	20	AHU-3	TU-3.48	NEW PRICE SDV	14"	1320	780	1300	4.2	63.2	140	110	10'	50	95	-	-	-	-	-	-	-	-	-
4002	CELL CULTURE	6	-75	AHU-4	TU-4.39	EXISTING	6"	275	155	200	0.6	8.6	140	110	10'	55	95	LEF-1A,1B,1C	EV-4.10	PRICE RDV	8"	350	230	GENERAL EXH	-	
4004	CELL CULTURE	6	-75	AHU-4	TU-4.51	EXISTING TU-3.25	8"	275	155	200	0.6	8.6	140	110	10'	55	95	LEF-1A,1B,1C	EV-4.11	PRICE RDV	8"	350	230	GENERAL EXH	-	
4006	CELL CULTURE	6	-75	AHU-4	TU-4.38	EXISTING TU-1.26	6"	275	155	200	0.6	8.6	140	110	10'	55	95	LEF-1A,1B,1C	EV-4.12	PRICE RDV	8"	350	230	GENERAL EXH	-	
4008	CELL CULTURE	6	-75	AHU-4	TU-4.37	EXISTING	6"	275	155	200	0.6	8.6	140	110	10'	55	95	LEF-1A,1B,1C	EV-4.13	PRICE RDV	8"	350	230	GENERAL EXH	-	
4010	OFFICE	N/A	25	AHU-3	TU-4.52	EXISTING TU-3.27	6"	135	75	135	0.4	6.6	140	110	10'	50	95	-	-	-	-	-	-	-	-	
4022	PASSAGE/WORK	N/A	5	AHU-3	TU-4.32	EXISTING	6"	200	100	100	0.3	4.9	140	110	10'	50	95	-	-	-	-	-	-	-	-	
4022A	OFFICE	N/A	20	AHU-3	TU-4.49	EXISTING TU-1.28	5"	100	75	100	0.3	4.9	140	110	10'	50	95	-	-	-	-	-	-	-	-	
4022B	CLEAN FABRICATION	6	-50	AHU-3	TU-4.33	EXISTING	7"	200	200	200	0.6	9.7	140	110	10'	50	95	EF-9	-	-	-	250	250	GENERAL EXH	-	
4022C	MECHANICS FABRICATION	6	-50	AHU-3	TU-4.50	EXISTING TU-3.29	6"	200	200	200	0.6	9.7	140	110	10'	50	95	EF-9	-	-	-	250	250	GENERAL EXH	-	
4022D	ELECTRONICS FABRICATION	6	-50	AHU-3	TU-4.31	EXISTING	6"	200	200	200	0.6	9.7	140	110	10'	50	95	EF-9	-	-	-	250	250	GE & SNORKEL	-	
4022E	SENSITIVE MEASUREMENT	N/A	-75	AHU-3	TU-4.30	EXISTING	8"	300	300	300	1.0	14.6	140	110	10'	50	95	EF-9	-	-	-	375	375	GENERAL EXH	-	
5024	DRY LAB	N/A	90	AHU-3	TU-5.21	EXISTING	12"	840	500	840	2.7	40.8	140	110	10'	50	95	-	-	-	-	-	-	-	-	
5024A	DRY LAB SUPPORT	N/A	20	AHU-3	TU-5.24	NEW OR EXISTING TU-1.32	6"	120	75	120	0.4	5.8	140	110	10'	50	95	-	-	-	-	-	-	-	-	
5024B	DRY LAB SUPPORT	N/A	15	AHU-3	TU-5.25	EXISTING TU-1.29	6"	165	100	165	0.5	8.0	140	110	10'	50	95	-	-	-	-	-	-	-	-	
6020	DRY LAB	N/A	30	AHU-3	TU-6.0	NEW PRICE SDV	14"	1080	600	1080	3.5	52.5	140	110	10'	50	95	-	-	-	-	-	-	-	-	

NOTES
 1. ALL LAB EXHAUST AIR TERMINAL UNITS (LISTED AS SIEMENS) ARE PROVIDED BY OWNER (THROUGH PPA AGREEMENT WITH SIEMENS), INSTALLED BY HVAC CONTRACTOR, WIRED BY CONTROLS INSTALLATION CONTRACTOR. ALL OTHER TERMINAL UNITS ARE PROVIDED AND INSTALLED BY HVAC CO.
 2. ALL FUME HOOD CONTROLS WILL BE PROVIDED BY OWNER (THROUGH PPA AGREEMENT WITH SIEMENS), INSTALLED AND WIRED BY CIC.
 3. ALL SUPPLY AIR TERMINAL UNITS SHOWN AS EXISTING TU-### ARE EXISTING UNITS THAT ARE TO BE RELOCATED. FOR ALL EXISTING UNITS, REBALANCE HOT WATER FLOW RATES TO NEW VALUES SHOWN AND REPROGRAM BOX AIRFLOWS TO VALUES SHOWN. ALL EXHAUST AIR TERMINAL UNITS ARE NEW.
 4. ALTERNATE #1 SHALL INCLUDE ALL WORK FOR ROOMS 1005 AND 10011. AS PART OF BASE BID, FOR THE AIR TERMINAL UNITS NOTED AS "NEW OR EXISTING TU-1.32, 1.33 OR 1.34", PROVIDE A NEW VAV BOX. AS PART OF ALTERNATE #1, THESE AIR TERMINAL UNITS SHALL BE RELOCATED FROM THE FIRST FLOOR TO THIS AREA.

CABINET UNIT HEATER SCHEDULE	
TAG	CUH-4
MANUFACTURER	TRANE
MODEL #	FFEB030
WEIGHT (LBS)	80
V-PH-HZ	120-1-60
WATTS	80
DISCONNECT	BY MFR
TOTAL CFM	315
EXTERNAL STATIC	N/A
EADB (°F)	70
EWT (°F)	140
FLUID TYPE	FW
GPM	1.5
MAX WPD (FT H2O)	5
NOTES	1,2,3,4
NOTES	1. RECESSED HORIZONTAL CABINET UNIT HEATER IN CEILING 2. BOTTOM INLET AND OUTLET 3. WHITE FACTORY FINISH 4. MERV 8 FILTER

SNORKEL SCHEDULE							
TAG	SN-1	SN-2	SN-3	SN-4	SN-5	SN-6	
MANUFACTURER	NEDERMAN	NEDERMAN	NEDERMAN	NEDERMAN	NEDERMAN	NEDERMAN	NEDERMAN
MODEL	FX2-75	FX2-75	FX2-75	FX2-75	FX2-75	FX2-75	FX2-75
WEIGHT (LBS)	11	11	11	11	11	11	11
AIRFLOW (CFM)	75	75	75	75	75	75	75
STATIC PRESSURE DROP	0.6"	0.6"	0.6"	0.6"	0.6"	0.6"	0.6"
ARM LENGTH	5'	5'	5'	5'	5'	5'	5'
NOTES	1,2	1,2	1,2	1	1	1	1
NOTES	1. WALL-MOUNTING BRACKET 2. PROVIDE AS PART OF ALTERNATE #1						

DIFFUSER AND GRILLE SCHEDULE								
TAG	NOM SIZE	NECK	MAX NG	TYPE	MFR	MODEL	FINISH	NOTES
IN2	24 x 24	8"	-	INDUCTION DIFFUSER	DADANCO	IDS08I	WHITE	1,2
IN3	24 x 24	10"	-	INDUCTION DIFFUSER	DADANCO	IDS08I	WHITE	1,3
S2	24 x 24	8", 12 x 12	25	PERFORATED LAB DIFFUSER	PRICE	PDA	WHITE	5
S4	24 x 24	10", 15 x 15	25	PERFORATED LAB DIFFUSER	PRICE	PDA	WHITE	5
E1	24 x 12	-	20	PERFORATED LAB RETURN	PRICE	PDR	WHITE	5
E2	24 x 24	-	20	PERFORATED LAB RETURN	PRICE	PDR	WHITE	5
R1	24 x 12	-	20	EGGCRATE GRILLE	PRICE	80	WHITE	4
NOTES	1. INDUCTION DIFFUSER WITH PRIMARY AIR INLET, 50F PRIMARY AIR TEMP, 75F ROOM AIR TEMP 2. RE-USE EXISTING DIFFUSERS. PROVIDE 3 NEW AS PART OF BASE BID, 0 NEW AS PART OF ALTERNATE #1. CONFIRM COUNTS PRIOR TO BID. 3. RE-USE EXISTING DIFFUSERS. PROVIDE 2 NEW AS PART OF BASE BID, 12 NEW AS PART OF ALTERNATE #1. CONFIRM COUNTS PRIOR TO BID. 4. RE-USE EXISTING GRILLES. 5. NEW DIFFUSERS FOR THIS PROJECT.							

FAN SCHEDULE			
TAG	LEF-1C	EF-9	
MANUFACTURER	GREENHECK	GREENHECK	
MODEL	VEKTOR-MS-24-4-70	USF-12-B6	
WEIGHT (LBS)	4500	200	
V-PH-HZ	480-3-60	480-3-60	
HP	15	1	
STARTER	VFD BY HVAC CONTRACTOR	VFD BY HVAC CONTRACTOR	
DISCONNECT	BY MFR	BY MFR	
AIRFLOW MAX (CFM)	12,550	1,500	
AIRFLOW MIN (CFM)	5,100	-	
OUTLET VELOCITY (FPM)	3,400	-	
EXTERNAL STATIC PRESSURE	3"	2"	
MIN EFFECTIVE PLUME HEIGHT	30'	-	
NOTES	1,2,3,4,5,6,7	8,9,10,11	
NOTES	1. ROOF-MOUNTED LAB EXHAUST FAN WITH COATING 2. CONNECTED TO EXISTING 2-FAN SETUP 3. PLENUM WITH BYPASS DAMPER AND WEATHERHOOD 4. ISOLATION DAMPER 5. VFD RATED TEFC MOTOR WITH SHAFT GROUNDING 6. MATCH ACCESSORIES AND SETUP OF EXISTING FANS 7. ISOLATION AND BYPASS DAMPER ACTUATORS BY MANUFACTURER 8. OUTDOOR-RATED UTILITY SET FAN WITH WEATHERHOOD AND COATING 9. GRAVITY BACKDRAFT DAMPER ON FAN DISCHARGE (UPBLAST) 10. 18" ROOF RAILS AND 1" SPRING ISOLATORS 11. VFD IS FOR BALANCING PURPOSES; UNIT TO RUN AT CONSTANT SPEED		

DATE: 03 MAR 2025
 SCALE: 1/4" = 1'-0"
 DRAWN BY: [Signature]
 CHECKED BY: [Signature]
 PROJECT: [Project Name]



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 REVISIONS
 3 Addendum 3 03/24/2025

BL 417 GEOLOGY - FACILITY 100
 INDIANA UNIVERSITY BLOOMINGTON: BL417
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CONSTRUCTION DOCUMENTS



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03/23/26

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ENGINEERING DATA FOR
GEOLOGY - FACULTY 100

IU PROJ #20250361,
USA

44OP-415245

ARCHITECT

CMTA
ENGINEER

CONTRACTOR

DWG DESCRIPTION

GENERAL
 Cover Sheet
 TOCA Table of Contents

SCHEDULES
 Valve Schedule
 FEV Schedule

GENERAL
 LEG Legend & Abbreviations
 GEN General Notes
 TTRM1 TX-I/O Termination Spec.
 TTRM2 TX-I/O Termination Spec. 2
 TWIR TX-I/O Wiring Specification
 BAC BACnet Wiring Specification
 DWIR1 DXR Wiring Specification
 DWIR2 DXR Wiring Specification2

DWG DESCRIPTION

CONTROL DRAWINGS
 001-002 DEMOLITION PLAN
 003-006 SYSTEM ARCHITECTURE
 007-011 LEF-1 A-C CONTROL SYSTEM
 012-016 LEF-4 A-C CONTROL SYSTEM
 017-019 EF-9 CONTROL SYSTEM
 020-021 MISC MONITORING & CONTROL
 022-023 FHC - Sash Conf w Mod Vent
 024-026 LRC - Fast Act w HW Rht w EV
 027-029 RPC - Slow Act w HW Rht w EV
 030-031 VAV Supply Box w/HW (15109)
 032-033 CAV Exhaust Valve (15805)
 034-035 15050 - 2 Pipe CUH Htg

DDC PANEL LAYOUTS
 036-040 PXCM-1 AHU-1
 041-047 PXCM-2 AHU-2
 048-054 PXCM-4 AHU-4

REVISION HISTORY

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GEOLOGY - FACULTY 100
IU PROJ #20250361,

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
WLH	WLH			03/22/26

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440P-415245

TOCA

**Indianapolis
Smart Infrastructure**

Valve Submittal - Water

LOCATION: PROJECT NAME: GEOLOGY - FACULTY 100 DATE: 03/22/26
JOB NO: 44OP-415245 PAGE: 1
ENGR: WLH REV:

GENERAL NOTES:
 1. All valves 2-1/2" and larger have flanged ends, 2" and smaller have screwed ends.
 2. All control valves and wells shall be installed by the mechanical contractor.
 3. Standard abbreviations used on control valves are:
BODY TYPES: 3W - Three way; 2W - Two way; A - Angle; N.C. - Normally Closed; N.O. - Normally Open;
 NOC - Ball Valve can be N.O. or N.C.; BF - Butterfly Valve; DS - Double Seated;
UNITS: Steam inlet pressure, actual pressure drop, and shut off pressure indicated in PSIG.
ACTUATOR TYPES: SR - Spring Return; NSR - No Spring Return
 CR - Capacitor Driven Return; DA - Double Acting

Valve ID/ Location	Qty	Product Number	Valve Size	Body Type	Body Style	Actual Cv	Actuator Type	Design P. Drop (psi)	Required Flow (gpm)	Min (gpm)	Max (gpm)	Preset (gpm)	Steam Inlet	Press Drop (psi)	Valve Spec Sheet	Shut Off	ANSI Class	Comment
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Mechanical System: CUH-DXR				15050 - 2 Pipe CUH Htg															
V-2	1	259-02034	0.50	2W	Globe	1.00	NO-NSR	5	1.50	N/A	N/A	N/A	--	2.25	154 010	120	250	CUH-4 1999D	

Mechanical System: LAB VAV-EV DXR FAST				LRC - Fast Act w HW Rht w EV															
V-1	1	259-02038	0.50	2W	Globe	2.50	NO-NSR	5	3.60	N/A	N/A	N/A	--	2.0736	154 010	65	250	TU-1.42 ALT-1	

Mechanical System: LAB VAV-EV DXR SLOW				RPC - Slow Act w HW Rht w EV															
V-4	1	261-02036	0.50	2W	Globe	1.60	NO-NSR	5	3.20	N/A	N/A	N/A	--	4	154 010	120	250	TU-2.42	
V-5	1	261-02030	0.50	2W	Globe	0.40	NO-NSR	5	0.50	N/A	N/A	N/A	--	1.5625	154 010	120	250	TU-2.43 ALT-1	

Mechanical System: VAV-DXR				VAV Supply Box w/HW (15109)															
V-1	1	259-02032	0.50	2W	Globe	0.63	NO-NSR	5	1.10	N/A	N/A	N/A	--	3.0486	154 010	120	250	TU-1.38 ALT-1	
V-2	1	259-02036	0.50	2W	Globe	1.60	NO-NSR	5	2.30	N/A	N/A	N/A	--	2.0664	154 010	120	250	TU-1.40	
V-3	1	259-02038	0.50	2W	Globe	2.50	NO-NSR	5	4.20	N/A	N/A	N/A	--	2.8224	154 010	65	250	TU-3.48	
V-4	1	259-02030	0.50	2W	Globe	0.40	NO-NSR	5	0.40	N/A	N/A	N/A	--	1	154 010	120	250	TU-5.24 ALT-1	
V-5	1	259-02036	0.50	2W	Globe	1.60	NO-NSR	5	3.50	N/A	N/A	N/A	--	4.7852	154 010	120	250	TU-6.00	

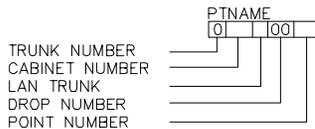
NOTES: All control valves and wells shall be installed by the heating contractor.

VALVE	UNIT REFERENCE	UNIT TYPE	FLOOR MARK	TYPE	DESIGN MAX FLOW	ACTUAL MAX FLOW	DESIGN MIN FLOW	ACTUAL MIN FLOW	MODEL NUMBER	CONTROL PACKAGE	MOUNTING OPTION	INLET (DUCT) SIZE	CASING MATERIAL AND SENSOR TYPE	END FITTING	CONTROLLER MODEL	ACTUATOR	FAILSAFE	FLOW TRANSMITTER	PART NUMBER
LAB FUME HOOD EXHAUST BOX																			
1	FEV	- 1.1	1ST FEV-1.1	EXH	860	1686	300	238	LGE	E011	R	10	BA	S	DXR2.E17C-103B	GNP191.1P	NO	DXA.S04P1	LGEE011R10BAS
2	FEV	- 1.2	1ST FEV-1.2	EXH	860	1686	300	238	LGE	E011	R	10	BA	S	DXR2.E17C-103B	GNP191.1P	NO	DXA.S04P1	LGEE011R10BAS
3	FEV	- 1.3	1ST FEV-1.3	EXH	860	1686	300	238	LGE	E011	R	10	BA	S	DXR2.E17C-103B	GNP191.1P	NO	DXA.S04P1	LGEE011R10BAS

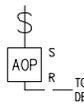
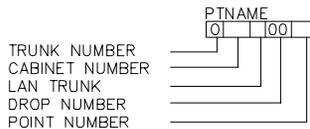
- LGE LABORATORY EXHAUST AIR TERMINAL
- EO11 LAB DXR BACNET IP WITH ACTUATOR AND FLOW TRANSMITTER
- R MOUNTING SIDE (R IS REQUIRED)
- 10 INLET SIZE
- BA STAINLESS STEEL CASING WITH ORIFICE SENSOR
- S SLIP END FITTING

CONTROL SYMBOL	CONTROL DESCRIPTION	CONTROL SYMBOL	CONTROL DESCRIPTION	CONTROL SYMBOL	CONTROL DESCRIPTION
AC	AIR COMPRESSOR	HHC	HAND-HELD OPERATOR'S TERMINAL	RCU	REMOTE CONTROL UNIT
AD	AIR DRYER	HL	HIGH LIMIT	RE	RELAY ELECTRIC
ADXR	ACTUATOR DXR	HMI	GAMMA TOUCH PANEL	RP	RELAY PNEUMATIC
AE	ACTUATOR ELECTRIC	HOA	HAND-OFF-AUTO SWITCH	RS	RESTRICTOR
AEM	APOGEE ETHERNET MICROSERVER	HORN	HORN	RV	RELIEF VALVE
AF	AIR FILTER	HPC	HEAT PUMP CONTROLLER	S/W	SOFTWARE
AFS	AIR FLOW STATION	HTD	HIGH TEMPERATURE DETECTOR	SC	STEP CONTROLLER
AOP	ANALOG OUTPUT, PNEUMATIC	HTE	HUMIDITY TRANSMITTER ELECTRIC	SCU	STAND ALONE CONTROL UNIT
AP	ACTUATOR PNEUMATIC	HTP	HUMIDITY TRANSMITTER PNEUMATIC	SD	SMOKE DETECTOR
APS	AUX. POWER SUPPLY	INT	INTERCOM	SE	SWITCH ELECTRIC
AT	AUTOMATIC TRAP	KWM	ELECTRIC KILOWATT METER	SIO	SLX IO MODULES
ATD	AUTO TANK DRAIN	LC	LIMIT CONTROLLER (LIMITEM)	SLX	APOGEE SLX CONTROLLER
ATEC	ACTUATOR TEC	LLS	LIQUID LEVEL SWITCH	SPKR	SPEAKER
AZM	AUTOZERO MODULE	LLT	LIQUID LEVEL TRANS.	SPP	STATIC PRESSURE PROBE
BCU	BUS COUPLING UNIT	LPR	POWER SUPPLY 24VAC/24VDC	SPR	STATIC PRESSURE REGULATOR
BELL	BELL	LTDE	LOW TEMP. DETECTOR ELECTRIC	SV	SOLENOID VALVE
BIM	BUS INTERFACE MODULE	LTDP	LOW TEMP. DETECTOR PNEUMATIC	SW	SWITCH PNEUMATIC
BOIL	BOILER	LUI	LOCAL USER INTERFACE	T	ROOM THERMOSTAT, PNEUMATIC
BRT	BRIGHTNESS	MBC	MODULAR BUILDING CONTROLLER	TBC	TERMINAL BOX CONTROLLER
BRTT	BRIGHTNESS AND TEMPERATURE	MDM	MODEM	TC	TEMPERATURE CONTROLLER(S200)
BTN	BUTTON	ME	ELECTRONIC ACTUATOR	TCU	TERMINAL CONTROL UNIT
CBL	CABLES	MEC	MODULAR EQUIPMENT CONTROLLER	TDR	TIME DELAY RELAY
CKV	CHECK VALVE	MG	MAGNEHELIC GAUGE	TE	THERMOSTAT, ELECTRIC
CM	CONSTRUCTION MATERIALS	MPU	MULTI-POINT UNIT	TEC	TERMINAL EQUIPMENT CONTROLLER
CP	COMPONENT PANEL	MS	MOTOR STARTER	TH	THERMOMETER
CPU	CENTRAL PROCESSING UNIT	OCC	OCCUPANCY	TI	TRUNK INTERFACE
CRT	CATHODE RAY TUBE	OCCB	OCCUPANCY AND BRIGHTNESS	TIE	TRUNK ISOLATOR EXTENDER
CS	CURRENT SWITCH	OBS	OBSOLETE	TIU	TELCOM INTERFACE UNIT
CT	CURRENT TRANSDUCER	ODP	OPERATOR DATA PANEL	TMR	TIMER, TIME CLOCK
CTTE	CO2 TEMP TRANSMITTER ELEC	P	PUMP	TTE	TEMPERATURE TRANSMITTER ELECTRIC
CVC	CONSTANT VOLUME CONTROLLER	PA	PULSE ACCUMULATOR	TTP	TEMPERATURE TRANSMITTER PNEUMATIC
D	DAMPER	PCT	PROGRAMMABLE CLOCK TIMER	TXIO	TX-I/O FAMILY CONTROLLER MODULES
DDC	DUAL DUCT CONTROLLER	PE	PRESSURE ELECTRIC SWITCH	UC	UNITARY CONTROLLER
DEM	DEMAND ENERGY MONITOR	PL	PILOT LIGHT	UCC	UNIT CONDITIONER CONTROLLER
DP	DEW POINT TRANSMITTER	PM	POWER MONITOR	UVC	UNIT VENT CONTROLLER
DPR	DIFFERENTIAL PRESS. REGULATOR	PNL	PANEL	V	VALVE
DPS	DIFFERENTIAL PRESSURE SWITCH	PPM	POINT PICKUP MODULE	V*	VALVE SERVICE PARTS
DPTE	DIFF. PRESS. TRANSMITTER ELEC.	PRC	PRESSURE REG. CONTROLLER	VA	TEC VALVE ACTUATOR
DPTP	DIFFERENTIAL PRESSURE PNEUMATIC	PRV	PRESSURE REDUCING VALVE	VAC	VARIABLE AIR VOLUME CONTROLLER
DPU	DIGITAL POINT UNIT	PS	POSITIONING SWITCH	VB	VIBRATION ISOLATOR
DXR	TERMINAL EQUIPMENT CONTROLLER	PSE	POSITION SENSOR ELECTRIC	VTE	VELOCITY TRANSMITTER ELECTRICAL
EC	ENTHALPY COMPARITOR	PST	PULL STATION	W	WELL
EP	ELECTRO-PNEUMATIC VALVE	PT	PITOT TUBE	WST	WEATHER STATION
ES	END SWITCH	PTE	PRESSURE TRANSMITTER ELECTRIC	XDR	TRANSDUCER
ET	ENTHALPY TRANSMITTER	PTP	PRESSURE TRANSMITTER PNEUMATIC	XFMR	TRANSFORMER
EXP	EXPANSION PANEL	PTR	PRINTER		
FAN	FAN	PV	PILOT VALVE		
FHC	FUME HOOD CONTROLLER	PXCC	PX COMPACT CONTROLLER		
FM	FLOW MTR. (FLOW METER STATION)	PXCM	PXC-MODULAR CONTROLLER		
FMS	FIRE MGMT. SYSTEM	PXG3	BACNET ROUTER ETHERNETIP-MS/TP		
FS	FLOW SWITCH	RBC	REMOTE BUILDING CONTROLLER		
FTP	FLOW TRANSMITTER PNEU.	RC	RECEIVER CONTROLLER		
G	GAUGE				
GD	GAS DETECTOR				
H	HYGROSTATS				
HE	HUMIDIFIER ELECTRIC				

DDC ELECTRICAL POINT



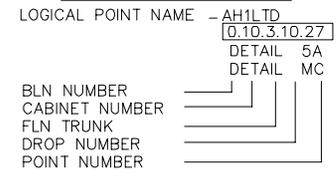
DDC PNEUMATIC POINT



DETAILS

- ELECTRICAL TERMINATION
- PNEUMATIC TERMINATION
- DETAIL XX STANDARD DDC TERMINATION
- NOTE OR REVISION
- DETAIL XX PAGE REFERENCE

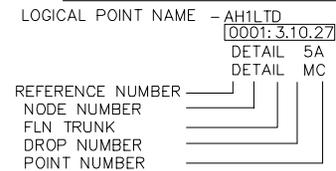
APOGEE: PII - EXAMPLE



← READ AS " SEE PAGE 5A FOR MORE DETAIL "

← DIGITAL INPUT

APOGEE: ETHERNET - EXAMPLE



← READ AS " SEE PAGE 5A FOR MORE DETAIL "

← DIGITAL INPUT

REVISION HISTORY

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GEOLOGY - FACULTY 100

IU PROJ #20250361,

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
WLH	WLH		02/15/19	03/22/26

Legend & Abbreviations

440P-415245

LEG

GENERAL NOTES FOR CONTROLS INSTALLATION CONTRACTOR (CIC)

1. All work shall be performed in accordance with the contract documents and all applicable codes and standards.
2. Provide and install all wiring, conduit, circuit breakers, etc., and any needed mounting hardware to install control devices/panels (brackets, extensions, stands, etc.) for a complete installation.
3. Mount, wire and pipe (control pneumatics) all devices including panels, sensors, relays, actuators, switches, sensor covers/guards, etc. for a complete installation.
4. All installation of the energy management system and components is by the CIC unless noted otherwise.
5. IU, IUI, IUK, IUE, through Siemens Building Technologies, Inc., will provide all system controllers, relays, transformers, sensors, prefabricated auxiliary panels and switches unless otherwise noted. The CIC will provide all installation materials necessary to mount, install, and wire all controls devices.
6. All devices to be installed according to manufacturer's recommendations and the contract documents. Field verify exact locations of all devices/equipment. Coordinate with Siemens.
7. All routings for electrical installation are to be verified by the CIC.
8. C.I.C. shall be responsible for interlock wiring between VFDs and local disconnect switches, where applicable.
9. C.I.C. shall coordinate their work with Siemens, the Contractor, other Subcontractors, and the Owner.
10. All control devices and panels that require 120V power that are not powered by the division 26 contractor shall require a dedicated circuit from its own breaker. Provide circuit breakers and power wiring where required.
11. Mount panels on racks when wall space is not available. The engineer shows panel locations on HVAC drawings. Actual panel locations are to be coordinated with the contractors and owner.
12. All line voltage wiring shall be installed in conduit.
13. All wiring must be pulled in one length. Splicing is not allowed. All Control wiring shall be continuous.
14. All wiring in mechanical rooms, concealed and inaccessible places and/or where required by project plans and specifications shall be installed in conduit.
15. Any conductor carrying voltage greater than 24VAC shall not occupy the same conduit as low voltage wiring.
16. Conduits installed outdoors or encased in concrete shall be in rigid conduit.
17. Open cable shall be installed only where space is accessible and allowed by the project plans and specifications. In these cases, cable shall be rated for space they occupy. Provide plenum rated materials as required.
18. See specifications and IU PPA Control Design Standard document for conduit use & installation requirements.
19. Provide as-built record drawings of installation of the system.
20. Record drawings shall include routing and sizing of communications wiring, sensor wiring, power trunk wiring, transformer locations, field device locations, etc.
21. C.I.C. shall receive, handle, and store, as needed, all material to be installed under their contract. Subcontractor shall be responsible for verification of quantity received. The CIC will be responsible for verifying all received material. Discrepancies must be immediately documented with the shipping company prior to their leaving the delivery site and shall be reported in writing to Siemens Building Technologies, Inc. within 48 hours. The CIC is responsible for the security of all materials received and stored. The CIC will replace, at his expense, any materials missing or damaged.
22. Provide and install all tags and labels per plans and specifications for all control devices. Coordinate tag and label text, size and type with Siemens. Tag wiring at the field panel with the full point name. Tag wiring at the field device with the full point address.
23. Terminate all wiring. If necessary, CIC will make all cutover terminations under the supervision of Siemens Building Technologies at startup, unless otherwise directed by Siemens.
24. CIC is responsible for participating in the commissioning process to the extent that it involves their installation work.
25. For wire runs to devices that require 24 VAC such as electric valve actuators, electric damper actuators, sensing devices, etc., CIC shall use the following wiring arrangement:
 - a. For devices that use a three-wire arrangement per the control drawings for carrying the 24VAC power and signal to the device, install cable type 18-gauge 3 conductor (18-3C) unless otherwise noted on control wiring diagrams. Neutral is tied together at the auxiliary panel.
 - b. For devices that use a four-wire arrangement per the control drawings for carrying the 24VAC power and signal to the device, use the following cable types unless otherwise noted on control wiring diagrams.
 - i. Install cable type 14-gauge 2 conductor (14-2C) for the 24VAC powering the device.
 - ii. Install cable type 18-gauge 2 conductor (18-2C) for the signal controlling the device.
 - iii. Tie neutrals together at the device.
 - c. QPA and Q series sensors may be landed to the RTS port on the BACnet TEC controller and will have a pre-terminated wire in either 50- or 100-foot length. See individual drawing details for further information.
26. C.I.C. shall use control wire according to the following schedule. Purchase wire manufactured by one of the following three vendors or approved equal. If wire size is not specified coordinate with Siemens and plan on using 12 gauge.
27. Minimum conduit size: 3/4".
28. Control wiring concealed in walls will be in EMT conduit. Existing wall will be 3/4" flex if inaccessible.
29. Wire size for terminal equipment devices will be either 18 AWG – 2 conductor or 18 AWG – 3 conductor wire unless otherwise noted or providing power to the TEC.

Anixter

Description	Part Number	Application
ETHERNET 23AWG, CAT6	CMP-00424AVA-7-06	Ethernet Network Communication cabling (verify type/color)
24-1p (STR) SHD Cable-Plenum	H-B-TSP24LC-CMP	BLN trunks
24-1p (STR) SDH Cable-Plenum	H-F-TSP24LC-CMP	FLN trunks
24-1.5p (STR) FT-6 Cable-Plenum	H-F-1.5TSP24LC-CMP	MSTP FLN BACnet trunks
20-2c (Solid) Cable-Plenum	KNX-TSP20LC-CMP	KNX Cable for DXR
18-2c (STR) Cable-Plenum	H-TP18-CMP	Point/low voltage wiring
18-3c (STR) Cable-Plenum	H-3C18-CMP	DXR/TEC actuators, transducers
18-6c (STR) Cable-Plenum	1806C-2-2N-01	Point/low voltage wiring
14-2c (STR) Cable-Plenum	H-2C14-CL3P	24VAC power trunk/power for devices

Anixter Contact: Gina Menolascino, Siemens Industry Account Manager
888-479-3830
2301 Patriot Blvd. Glenview, IL, 60026
sbt@anixter.com

Belden

Description	Part Number	Application
ETHERNET 23AWG, CAT6	2413F D151000	Ethernet Network Communication cabling (verify type/color)
24-1p (STR) SHD Cable-Plenum	YR48881 0031000 (CMP)	BLN trunks
24-1p (STR) SDH Cable-Plenum	YR49243 2121000 (CMP)	FLN trunks
24-1.5p (STR) FT-6 Cable-Plenum	SPECIAL ORDER WIRE	MSTP FLN BACnet trunks
20-2c (Solid) Cable-Plenum	SPECIAL ORDER WIRE	KNX Cable for DXR
18-2c (STR) Cable-Plenum	YM48514 0061000	Point/low voltage wiring
18-3c (STR) Cable-Plenum	YM48447 0061000	DXR/TEC actuators, transducers
18-6c (STR) Cable-Plenum	SPECIAL ORDER WIRE	Point/low voltage wiring
14-2c (STR) Cable-Plenum	YM48515 0131000	24VAC power trunk/power for devices

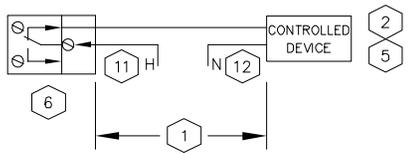
Belden Contact: Communications Supply Corporation
317-266-1600
1560 Indiana Avenue, Indianapolis, IN 46202
buybelden@gocsc.com

The Cable Company

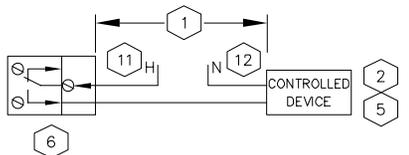
Description	Part Number	Application
ETHERNET 23AWG, CAT6	5652P66CMP1000	Ethernet Network Communication cabling (verify type/color)
24-1p (STR) SHD Cable-Plenum	5200BLN	BLN trunks
24-1p (STR) SDH Cable-Plenum	5200FLN	FLN trunks
24-1.5p (STR) FT-6 Cable-Plenum	5201P67FLN1000	MSTP FLN BACnet trunks
20-2c (Solid) Cable-Plenum	5212-P47KNX1003	KNX Cable for DXR
18-2c (STR) Cable-Plenum	5041SBT	Point/low voltage wiring
18-3c (STR) Cable-Plenum	5043SBT	DXR/TEC actuators, transducers
18-6c (STR) Cable-Plenum	5046P33CMP	Point/low voltage wiring
14-2c (STR) Cable-Plenum	5061SBT	24VAC power trunk/power for devices

TCC Contact: Caitlin/Bart
800-677-9473
498 Bonnie Lane, Elk Grove Village, IL 60007
ilsales@tccwire.com

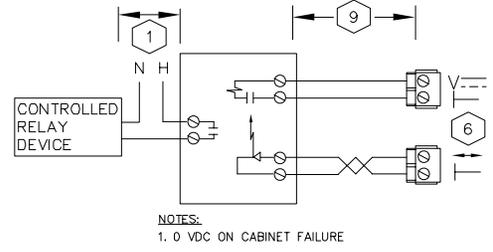
30. CIC shall create and keep an up to date list of DXR Bar Codes in a binder that is accessible to Siemens. CIC will create a list of terminal equipment that is controlled by DXR Controllers. CIC will remove the Bar Code from the DXR Controllers at the time of controls installation for each DXR and affix the Bar Code next to the associated Terminal Equipment Name in the DXR Bar Code Binder. CIC will scan the information and transmit in .pdf format to Siemens upon request.
31. CIC installation verification list. CIC shall create and keep an up to date list of the status of Mechanical System and Terminal Equipment controls installation in a binder that is accessible to Siemens. CIC will update Siemens weekly with the status of controls installation for each Mechanical System and each piece of Terminal Equipment.



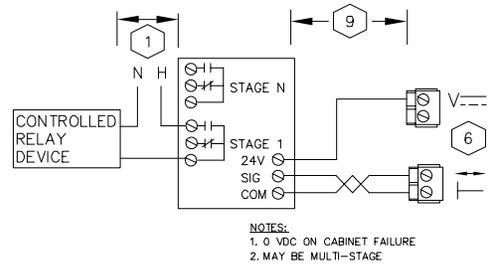
A
00 DIGITAL OUTPUT (6R) NC
PULSED OR LATCHED



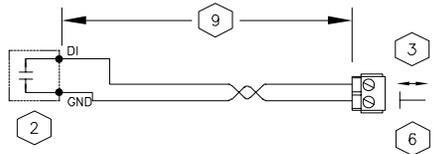
B
00 DIGITAL OUTPUT (6R) NO
PULSED OR LATCHED



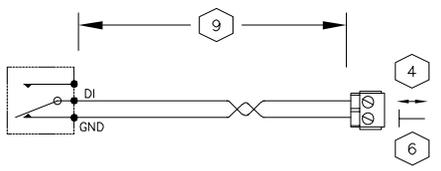
C
00 DIGITAL OUTPUT (8U,8X) Latched
VOLTAGE TO SOLID STATE RELAY



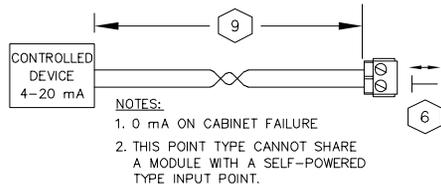
D
00 DIGITAL OUTPUT (8U,8X) Sequenced
VOLTAGE TO SEQUENCING MODULE



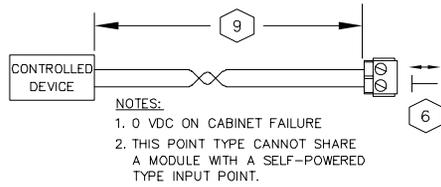
E
00 DIGITAL INPUT (8D,16D,8U,8X)
DRY CONTACT



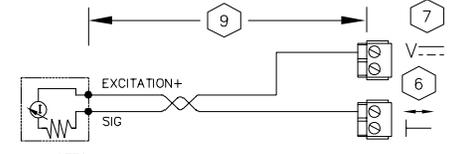
F
00 DIGITAL INPUT (8D,16D,8U,8X)
PULSE ACCUMULATOR



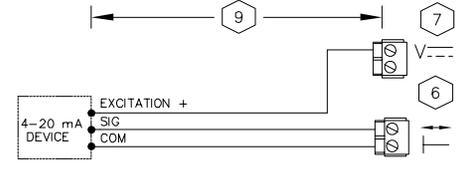
H
00 ANALOG OUTPUT (8X) 4-20 mA



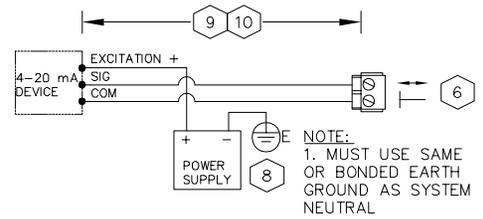
I
00 ANALOG OUTPUT (8U,8X) 0-10VDC



M
00 ANALOG INPUT (8X) 4-20 mA
2-WIRE INTERNAL POWERED



N
00 ANALOG INPUT (8X) 4-20mA
3-WIRE INTERNAL POWERED



O
00 ANALOG INPUT (8X) 4-20mA
3-WIRE EXTERNAL POWERED

- NOTES:**
- 1 MAXIMUM WIRE RUN LENGTHS ARE BASED ON THE CURRENT DRAW AND WIRE GAGE. SEE DRAWING TWIR.
 - 2 SEE CONTROL DRAWINGS FOR NORMAL DE-ENERGIZED CONTACT STATE
 - 3 MAXIMUM CONTACT CLOSURE RATE IS 10 PER SECOND
8D, 16d EXCITATION = 24VDC, 8mA
8U, 8X EXCITATION = 24VDC, 8mA,
20ms, 100mA

4 8D, 16D MAXIMUM PULSE RATE = 10Hz
(50ms PER STATE, 100ms PER PULSE)
8U, 8X MAXIMUM PULSE RATE = 20Hz
(25ms PER STATE, 50ms PER PULSE)

5 PXC MODULAR DO CONTACT RATINGS
AC OPERATION:
4A @ 240VAC (RESISTIVE)
3A @ 240VAC (INDUCTIVE)
SIZE 4 MOTOR STARTER
DC OPERATION:
40W @ < 50VDC
20W @ > 50VDC

6 REFER TO PXC MODULAR PANEL FOR
ACTUAL POINT ADDRESSES. REFER TO
TXMI TERMINATION TABLES FOR ACTUAL
TERMINALS FOR EACH PANEL ADDRESS.
COMMON TERMINAL MAY BE SHARED BY
2 POINTS.

7 REFER TO DRAWING P1 ON TWIR FOR
MAXIMUM CURRENT PROVIDED BY THE
24VDC SENSOR SUPPLY ON P1 BIM OR
BUS POWER SUPPLY

8 EXTERNAL POWER SUPPLY CAN EITHER
BE A 24VDC POWER SUPPLY OR A
24VAC TRANSFORMER DEPENDING ON
THE SENSOR SELECTED. IF NOT AN
ISOLATED NC CLASS 2 CIRCUIT THEN
POWER SOURCE, NEUTRAL AND PXC
MODULAR COMMON MUST BE BOTH
CONNECTED TO THE SAME OR BONDED
BUILDING APPROVED EARTH GROUND.
FOR FURTHER DETAILS SEE EARTH
GROUNDING RULES (125-3002) APOGEE
WIRING GUIDELINES FOR FIELD PANELS
AND EQUIPMENT CONTROLLERS.

9 50mA OR LESS - 750ft/230m
50mA TO 100mA - 375ft/115m

10 100mA TO 150mA - 250ft/76m
150mA TO 200mA - 187ft/57m
200mA TO 250mA - 150ft/46m

11 WHERE H TERMINAL IS NOT A NEC
CLASS 2 CIRCUIT, RELAY COMMON
TERMINAL BRANCH CURRENT MUST BE
EXTERNALLY LIMITED TO 10A MAXIMUM
BY AN NEC APPROVED MEANS. NOT A
FUSE.

12 WHERE REQUIRED, N TERMINAL BRANCH
CURRENT MUST BE EXTERNALLY LIMITED
BY AN NEC APPROVED MEANS.

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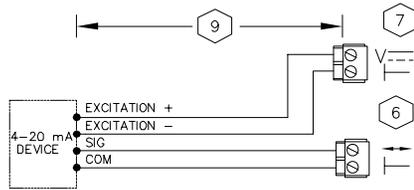
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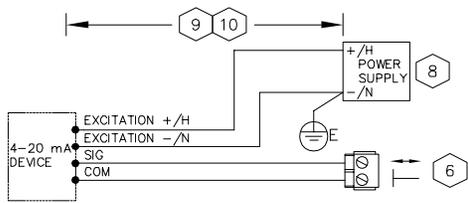
TX-I/O Termination Spec.

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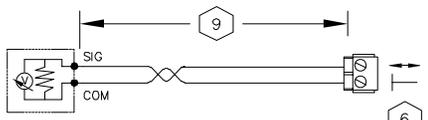
TTRM1



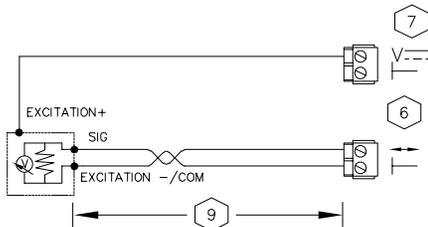
P 00 ANALOG INPUT (8X) 4-20mA
4-WIRE INTERNAL POWERED



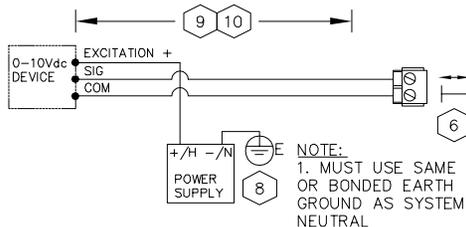
Q 00 ANALOG INPUT (8X) 4-20mA
4-WIRE EXTERNAL POWERED



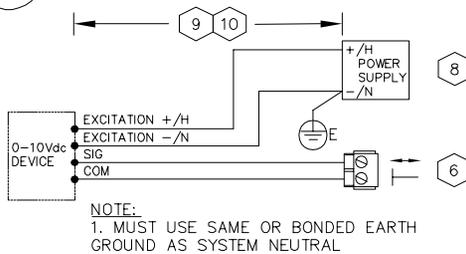
R 00 ANALOG INPUT (8X,8U) 0-10 Vdc
SELF POWERED TRANSDUCER



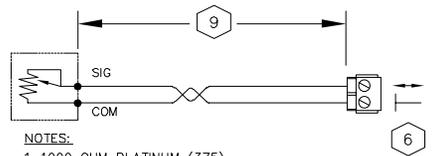
S 00 ANALOG INPUT (8X,8U) 0-10VDC
3-WIRE INTERNAL POWERED



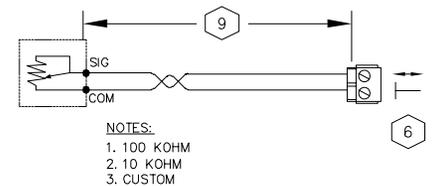
T 00 ANALOG INPUT (8U,8X) 0-10VDC
3-WIRE EXTERNAL POWERED



U 00 ANALOG INPUT (8U,8X) 0-10VDC
4-WIRE EXTERNAL POWERED



V 00 ANALOG INPUT (8X,8U) RTD



W 00 ANALOG INPUT (8X,8U) THERMISTOR

TXM1 TERMINATION TABLES

1. ALL TXM1 TERMINALS (MEASURING, NEUTRAL, RELAY, SUPPLY) ARE CONNECTED IN THE PLUG-IN I/O MODULE, NOT IN THE TERMINAL BUS.

TXM1.8D, TXM1.16D								
I/O POINT	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SYSTEM NEUTRAL ¹	⊥ (-)	1	3	5	7	9	11	13
DIGITAL INPUT	↑ (+)	2	4	6	8	10	12	14

1. NEUTRAL CAN BE CONNECTED TO ANY NEUTRAL TERMINAL ON SAME MODULE AND SEVERAL CAN SHARE SAME NEUTRAL TERMINAL.

TXM1.16D																
I/O POINT	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)								
SYSTEM NEUTRAL	⊥ (-)	18	20	22	24	26	28	30								
DIGITAL INPUT ¹	↑ (+)	19	21	23	25	27	29	31								

1. NO PULSE ACCUMULATOR

TXM1.8U, TXM1.8U-ML								
I/O POINT	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SYSTEM NEUTRAL	⊥ (-)	2	6	10	14	19	23	27
UNIVERSAL I/O	↑ (+)	4	8	12	16	21	25	29
24V AC/DC ACTUATOR SUPPLY ¹	~		7		15		24	

1. 24V DC ONLY AVAILABLE WITH BUS CONNECTOR MODULE (BCM) POWERED EXTERNALLY BY DC SUPPLY.

TXM1.8X, TXM1.8X-ML								
I/O POINT	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SYSTEM NEUTRAL	⊥ (-)	2	6	10	14	19	23	27
UNIVERSAL I/O	↑ (+)	4	8	12	16	21	25	29
24V AC/DC ACTUATOR SUPPLY ²	~		7		15		24	
24V DC SENSOR SUPPLY ³	==	3		11		20		28

1. 4-20 mA OUTPUT AVAILABLE ON POINTS 5-8 ONLY.

2. 24V DC ONLY AVAILABLE WITH BUS CONNECTOR MODULE (BCM) POWERED EXTERNALLY BY DC SUPPLY.

3. MAY POWER EXTERNAL SENSORS 0.6w (25mA) OR 1.2w (50mA) PER TERMINATION UP TO 2.4w (100mA) MAXIMUM FOR ALL TERMINATIONS.

TXM1.6R, TXM1.6R-M						
I/O POINT	(1)	(2)	(3)	(4)	(5)	(6)
COMMON ¹	↑ (C)	3	9	15	20	26
NORMALLY CLOSED	↖ (NC)	4	10	16	19	25
NORMALLY OPEN	↑ (NO)	2	8	14	21	27

1. COMMONS ARE NOT INTERNALLY CONNECTED.

NOTE: REFER TO TERMINATION SHEET #1 FOR INSTALLATION DETAILS.

REVISION HISTORY

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TX-I/O Termination Spec. 2

440P-415245

TTRM2

PXC MODULAR WIRING TYPE AND GAUGE REQUIREMENTS

TABLE 1

CIRCUIT TYPE	CLASS	WIRE TYPE	MAX. DISTANCE	CONDUIT SHARING ²
AC LINE POWER ¹	POWER	#12-14 THHN	REFER TO NEC	CHECK LOCAL CODES
DIGITAL OUTPUT	1 & 2	TP not required, check job specs & local codes #18 to #24 AWG	SEE TABLE 3	CHECK LOCAL CODES
DIGITAL INPUT	2	TP not required, check job specs & local codes #18 to #24 AWG	750ft (230 m)	CHECK LOCAL CODES
ANALOG INPUT ⁴ 100K/10K Thermistor	2	#18-#24 TP ^{3/8} or TSP ⁵ CM(FT4) or CMP(FT6)	750ft (230 m)	CHECK LOCAL CODES
ANALOG INPUT ⁴ 1K Ni OR RTD	2	#18-#24 TP ^{3/8} or TSP ⁵ CM(FT4) or CMP(FT6)	750ft (230 m)	CHECK LOCAL CODES
ANALOG INPUT 0-10 V	2	#18-#24 TP ^{3/8} or TSP ⁵ CM(FT4) or CMP(FT6)	750ft (230 m)	CHECK LOCAL CODES
ANALOG INPUT 4-20 mA	2	#18-#24 TP ^{3/8} or TSP ⁵ CM(FT4) or CMP(FT6)	750ft (230 m)	CHECK LOCAL CODES
ANALOG OUTPUT 0-10 V	2	#18-#24 TP ^{3/8} or TSP ⁵ CM(FT4) or CMP(FT6)	750ft (230 m)	CHECK LOCAL CODES
ANALOG OUTPUT 4-20 mA	2	#18-#24 TP ^{3/8} or TSP ⁵ CM(FT4) or CMP(FT6)	750ft (230 m)	CHECK LOCAL CODES
ETHERNET ALN	2	#24 (4) TP ⁶ CAT5 OR BETTER	295ft (90 m)	CHECK LOCAL CODES
ALN TRUNK	2	#24 TSP	SEE TABLE 4	CHECK LOCAL CODES

- WHEN DAISY-CHAINING 24VAC POWER TO CONTROLLERS USE #14 WIRE.
- CONDUIT SHARING RULES: ONLY WHERE LOCAL CODES PERMIT. BOTH CLASS 1 AND CLASS 2 WIRING CAN BE RUN TO THE PXC PROVIDED THE CLASS 2 WIRE IS UL LISTED 300V 75°C(167°F) OR HIGHER OR THE CLASS 2 WIRE IS NEC TYPE CM (FT4) (75°C OR HIGHER) OR CMP(FT6) (75°C OR HIGHER). NEC TYPE CL2 AND CL2P IS NOT ACCEPTABLE UNLESS ALSO UL LISTED AND MARKED 300V 75°C (167°F) OR HIGHER
- TWISTED PAIR, NON-JACKETED UL LISTED 75°C(167°F) AND 300V, CABLE CAN BE USED IN PLACE OF CM(FT4) OR CMP(FT6)(BOTH MUST BE RATED 75°C OR HIGHER) CABLE WHEN CONTAINED IN CONDUIT PER LOCAL CODES. SEE THE FIELD PURCHASING GUIDE FOR WIRE.
- WIRE LENGTH AFFECTS POINT INTERCEPT ENTRY. ADJUST INTERCEPT ACCORDINGLY FOR EACH WIRE GAUGE AND SENSOR TYPE.
- SHIELDED TWISTED PAIR (TSP) IS NOT REQUIRED FOR ELECTRICAL NOISE LEVELS UP TO 10 V/M. AT HIGHER LEVELS TSP MAY BE NEEDED. TERMINATE SHIELD ON ENCLOSURE AND TAPE BACK ON POINT END.
- FOR 24AWG INSTALL CATEGORY 5 OR BETTER CABLE PER ANSI/TIA/EIA-568-B.1 OR HIGHER. USE SOLID COPPER BETWEEN JACK BOXES. USE STRANDED COPPER PATCH CABLES 13ft (4m) TO CONNECT PXC AND 20ft (6m) TO CONNECT SWITCH OR HUB.

PXCM WIRE SPECIFICATIONS

TABLE 2

CABLE CONFIGURATION	LOW-VOLTAGE POINT APPLICATIONS	POINT USAGE	ALN TRUNK	EALN
TWISTED PAIR OR TSP	TWISTED PAIR OR TSP	TWISTED PAIR (UNJACKETED) OR TSP	TWISTED SHIELDED PAIR	(4) TWISTED PAIR
GAUGE	#18 TO #22 AWG (STRANDED)	#18 TO #22 AWG (STRANDED)	24 AWG (STRANDED)	24AWG(STRANDED)
CAPACITANCE	n.a.	n.a.	12.5 pf/ft OR LESS	13 pf/ft OR LESS
TWISTS PER FOOT	6 MINIMUM	6 MINIMUM	6 MINIMUM	CATEGORY 5 Min
SHIELDS	NOT REQUIRED (IN CASE OF TSP, 100% FOIL W/ DRAIN WIRE)	NOT REQUIRED (IN CASE OF TSP, 100% FOIL W/ DRAIN WIRE)	100% FOIL W/ DRAIN WIRE	NOT REQUIRED
NEC CLASS	CM, CMP (75°C OR HIGHER)	NOT SPECIFIED	CM, CMP (75°C OR HIGHER)	MM, MMP
CEC CLASS	FT4, FT6 (75°C OR HIGHER)	NOT SPECIFIED	FT4, FT6 (75°C OR HIGHER)	NOT SPECIFIED
UL VOLTAGE RATING	NOT SPECIFIED	300 VAC ?	NOT SPECIFIED	NOT SPECIFIED
UL TEMP. RATING	NOT SPECIFIED	75°C (167°F)	NOT SPECIFIED	NOT SPECIFIED

- UL RECOGNIZED WIRE (LABELED WITH A BACKWARDS "RU") IS NOT FIELD INSTALLABLE. USE ONLY UL-LISTED WIRE.
- 300 VAC WIRE CAN BE USED IN FIELD PANELS CONTAINING VOLTAGES BELOW 150 VAC.

REVISION HISTORY

MAXIMUM DO WIRE RUN LENGTHS

TABLE 3

NOMINAL INRUSH	STARTER SIZE	WIRE SIZE		
		#18	#16	#14
200 VA	0 1	500ft (152m)	900ft (274m)	1400ft (427m)
550 VA	2	200ft (61m)	300ft (91m)	500ft (152m)
1150 VA	3	100ft (30m)	150ft (46m)	250ft (76m)
1500 VA	4	70ft (21m)	100ft (30m)	200ft (61m)

TABLE 3 NOTES:

- DISTANCES SHOWN ASSURE LESS THAN 10% VOLTAGE DROP ACROSS THE WIRE FOR A TYPICAL STARTER.
- PXCM DO CONTACT RATINGS
4A @ 250VAC & 30VDC
SIZE 4 MOTOR STARTER

MAXIMUM NUMBER HSTIE IN SERIES ON ALN TRUNK

TABLE 4

SPEED	1200 BAUD	4800 BAUD	9600 - 38.4K	57.6K - 115.2K
	BAUD	BAUD	BAUD	BAUD
SERIES TIE'S	10	7	6	6
ALN TRUNK DISTANCE	4000ft (1.2km)	4000ft (1.2km)	4000ft (1.2km)	3280ft (1km)

- TIE MUST BE USED TO ISOLATE ALN BETWEEN PXCM CONNECTED TO DIFFERENT SERVICE GROUNDS OR ON BOTH SIDES OF THE ALN CABLE THAT EXITS BUILDING.
- THE MAX ALN DISTANCE APPLIES TO EACH SIDE OF THE TIE.

GENERAL NOTES:

- COMPLY WITH LOCAL BUILDING CODES
- SIZE WIRE FOR LOAD, CURRENT, AND VOLTAGE.
- ALL WIRE TO BE APPROVED OR LISTED FOR THE INTENDED APPLICATION BY AGENCIES SUCH AS UL, NEC, CSA.
- ALWAYS REFER TO LOCAL CODES FOR CONDUIT SHARING.
- WIRING MUST HAVE INSULATION RATED FOR HIGHEST VOLTAGE CIRCUIT IN CONDUIT.
- THE ALN TRUNK MUST BE AN UNINTERRUPTED RUN BETWEEN CABINETS. NO SPLICES ALLOWED.
- CM/CMP/MM/MMP WIRE IS NOT USABLE FOR CLASS 1 CIRCUITS.
- FOR EXTENDED TEMPERATURE INSTALLATIONS USE ONLY COPPER WIRE LISTED FOR 90°C OR HIGHER

ENCLOSURE H x W x D (IN)

- PXA-ENC-19 19 x 22 x 5 3/4
- PXA-ENC-34 34 x 22 x 5 3/4
- PXA-ENC-18 18 x 22 x 6

KNOCKOUT TYPES

- A = 1" & 1-1/4"
- B = 3/4" & 1"
- C = 1/2" & 3/4"

T1
00

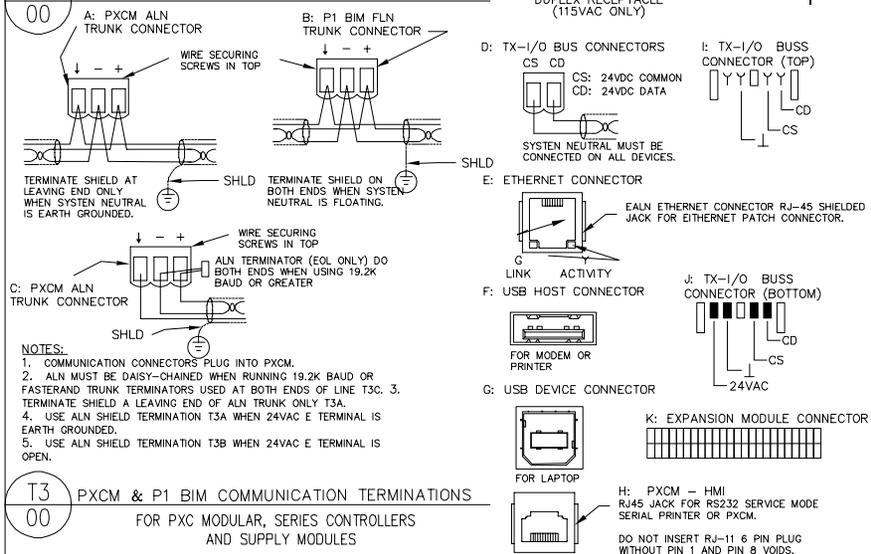
PXCM CONDUIT PENETRATIONS

SERVICE BOX MAX POWER SOURCE REQUIREMENTS	
VOLTAGE:	102-132 VAC 204-264 VAC
LINE FREQUENCY:	50 / 60 Hz
115V OUTLETS:	200 VA (MAX.) PXA-SB115V384VA 2 240 VA (MAX.) PXA-SB115V192VA 2 220 VA (MAX.) PXA-SB230V384VA 440 VA (MAX.) PXA-SB230V192VA 220 VA (MAX.)

PXCM FAMILY VA RATINGS & SENSOR SUPPLY			
PRODUCT	24VDC (W)	24VAC INPUT VA	24VAC OUTPUT VA
PXC00-X	0	24	0
PXC100-X	0	24	0
TXB1.P1	14.4	125	96
TXS1.12F4	28.8	150	96
TXS1.EF4	0	96	96
TX-I/O MODULE 24VDC LOAD (W) MAX.			
TXM1.8D	1.1		
TXM1.16D	1.4		
TXM1.8U	1.5		
TXM1.8U-ML	1.8		
TXM1.8X	2.2		
TXM1.8X-ML	2.3		
TXM1.6R	1.7		
TXM1.6R-M	1.9		

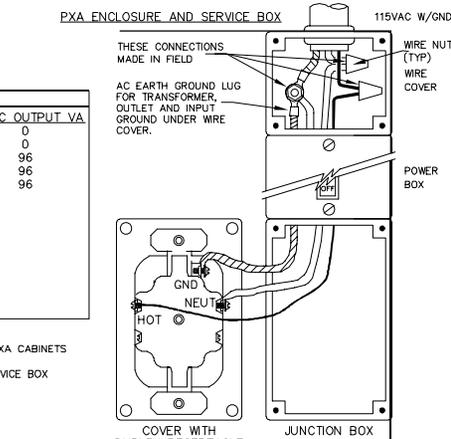
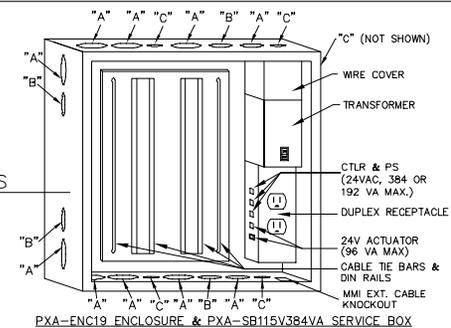
T2
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PXCM POWER WIRING



T3
00

PXCM & P1 BIM COMMUNICATION TERMINATIONS FOR PXC MODULAR, SERIES CONTROLLERS AND SUPPLY MODULES



GEOLOGY - FACULTY 100

IU PROJ #20250361,

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
WLH	WLH		02/15/19	03/22/26

TX-I/O Wiring Specification

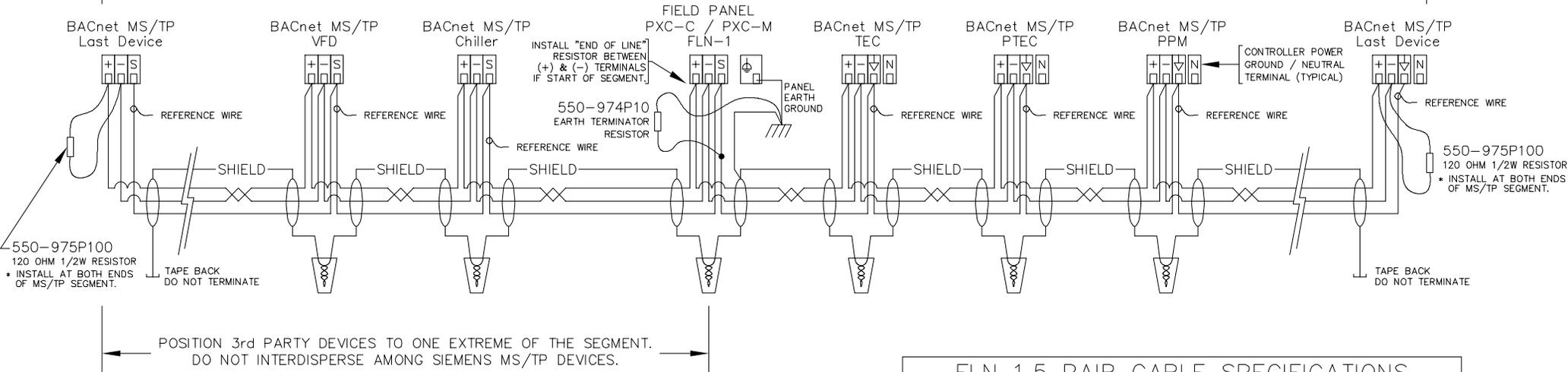
440P-415245

TWIR

MAX. DISTANCE 4000 ft (1219 m) UP TO 57.6k bps
 MAX. DISTANCE 3280 ft (1000 m) OVER 57.6k bps

3RD PARTY DEVICES ←

→ SIEMENS DEVICES

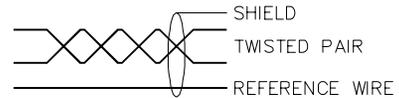


1 BACnet MS/TP FLN NETWORK
 T06 COMMUNICATION PROTOCOL: RS-485
 1.5 PAIR (2 Conductor TSP + 1 Conductor)

NOTES

- NEVER RUN NETWORK CABLING CLOSER THAN 5 FEET TO A VARIABLE FREQUENCY DRIVE (VFD) EXCEPT AT THE POINT WHERE THE NETWORK MUST CONNECT TO THE VFD. NETWORK ENTRY INTO A VFD MUST BE THROUGH A SEPARATE CONDUIT AND ALL NETWORK WIRING MUST BE KEPT AS FAR AS POSSIBLE FROM HIGH POWER CABLING IN THE VFD DRIVE.
- NEVER RUN NETWORK CABLE CLOSER THAN 5 FEET TO CONDUITS CARRYING 100KVA OR GREATER. ALWAYS CROSS HIGH POWER CABLES (AT A DISTANCE OF ≥ 5 FEET) AT A 90 DEGREE ANGLE.
- NETWORK RUN IN OPEN CABLE TRAYS WITH CIRCUITS CARRYING 20 AMPS SHOULD BE KEPT AT LEAST 26 INCHES FROM THE HIGHER POWER CABLES.
- NETWORK RUN IN ENCLOSED TRAYS WITH CONDUITS CARRYING OVER 20 AMPS SHOULD BE KEPT AT LEAST 18 INCHES FROM THE HIGHER POWER CABLES.

FLN 1.5 PAIR CABLE SPECIFICATIONS



TWISTED PAIR
24 AWG (STRANDED) 11 PICO FARAD/FT CAPACITANCE OR LESS (CONDUCTOR TO CONDUCTOR) 24 PICO FARAD/FT CAPACITANCE OR LESS (CONDUCTOR TO SHIELD) 4 TWISTS PER FOOT
REFERENCE WIRE
24 AWG (STRANDED) 3 INCH LAY WITH TWISTED PAIR
SHIELD
100% OVERALL FOIL WITH DRAIN WIRE

PART NUMBERS

ANNIXTER
PART NUMBER: H-F-1.5TSP24LC-CMP DESCRIPTION: 24-1.5PR STR TC FFEP FT6 SHD YEL/BLU (FT-6)
CERCO
PART NUMBER: 8304R DESCRIPTION: 22AWG 3C STR FT6 ORG (FT-6)

REVISION HISTORY

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GEOLOGY - FACULTY 100				
IU PROJ #20250361,				
ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
WLH	WLH		02/15/19	03/22/26
BACNET WIRING SPECIFICATION				

440P-415245

BAC

Important Safety Information

System-specific:

The electrical safety for building automation and control systems by Siemens Building Technologies is essentially based on safely separating low voltage from mains voltage.

Application as per SELV or PELV pursuant to HD 384 "Electrical installation of buildings" depending on the grounding (24V AC) of the low voltage:

Ungrounded = Safety Extra-Low Voltage (SELV). Grounded = Protection by Extra Low Voltage (PELV). Device-related safety is guaranteed, among others, by:

1. Low-voltage power supply 24V AC per SELV or PELV
2. Comply with specific regulations for electrical wiring per the following sections.
3. Observe the following points when grounding 24V AC (system neutral):
4. Operating voltage of 24V AC is permitted in principle for both grounded as well as non-grounded system neutral. Local regulations and customers apply accordingly.
5. Grounding may be required or not allowed for functional reasons.
6. 24V AC systems are generally grounded unless disavowed by the manufacturer.
7. In order to avoid ground loops, connect systems with PELV to the ground at one location only (especially for transformers), if no other indication exists.

Mains and operating voltage:

Operating voltage 24V AC:

1. It must meet requirements for SELV or PELV. Permitted deviation for nominal voltage 24V AC on the device: -10 +/ - 20%.

Transformer specification 24V AC:

1. Use safety insulating transformers as per EN 61558 with double insulation designed for 100% duty to supply SELV or PELV circuits..
2. Power taken from the transformer should be at least 50% of nominal load for efficiency reasons (effectiveness).
3. Transformer nominal power should be at least 25VA. For smaller transformers, the ratio of open circuit voltage to full load is unfavorable (> + 20%).

Operational voltage fuse 24V AC:

Transformers on the secondary side correspond to the actual load of all connected devices as per transformer sizing:

1. 24V AC line (system potential) must always be fused.
2. There required, also line (system neutral).

Mains filter:

Spikes and high-frequency interference may occur in areas with high levels of interference. The disturbances not only impact the transformer on the primary side, but may also influence secondary connected components.

A mains filter should be attached on the primary transformer if such interference is anticipated. Mains filters should be installed as close to the network transformer as possible and grounded.

Device-specific :

Devices using different power circuits: Devices must have the required insulation of the power circuits from each other to be able to connect them directly without additional insulation.

Interfaces for different voltage circuits :

Connections via interfaces increase the risk of distributing dangerous voltage through the building. Ensure that the required insulation is available at all times and installed per applicable regulations.

DXR2 with 24V AC supply:

1. A class 2 transformer or an external T4 A fuse is compulsory.
2. Max. 100VA per transformer / per fuse circuit.

Installation:

Mounting position:

Recommended:

1. Wall, horizontal from left to right or from right to left.
2. Wall, vertical from bottom to top.
3. Ambient temperature 23 to 122F (-5 to 50 °C)

AC 24V power lines:

1. DXR2 room automation stations with 24V AC supply are limited to a consumption of 4A/100VA.
2. Supply: Class 2 transformer OR external 4A fuse OR transformer >100VA for more than one DXR2. (In this case a separate 4A fuse is required for every 100VA).
3. DXR2 room automation stations with 24V AC supply can only be wired in star topology.
4. An external power supply of field devices should be fused separately for secure operation.

24V AC Transformer :

Operating voltage :

1. The operating voltage is 24V AC. It must comply with SELV or PELV to HD 60364-4-41 (2007-01-01) requirements.
2. The acceptable deviation of the 24V AC nominal voltage connected to the transformer is +20%/-10%. This means that after taking account of the cable and contact resistances, a tolerance of +/-20% for the field device supply can be guaranteed in the field devices.

Specification for 24V AC transformers:

1. Double-insulated safety transformers to EN 61558, designed for continuous operation, to supply SELV or PELV circuits.
2. The rated transformer output must be at least 50VA. In smaller transformers the ratio of no-load voltage to full-load voltage is unfavorable (> +20%).
3. For reasons of power efficiency the rated transformer output should not exceed 200 % of the maximum load.

Wiring DXR2:

The 24V AC can only be wired in star distribution for the DXR2 room automation stations. 24V AC must be fused with max. 4A (or Class 2 transformer).

Power consumption DXR2 24V AC:

Max. permissible input current 24V AC (through terminals 5 and 6) = Total max. 4A.

Base load (without loading by field devices)

DXR2.M11, DXR2.x12P	9VA
DXR2.M18	11VA
DXR2.E18	13VA
KNX PL-Link supply	5VA/3W
29V DC / Max. 50 mA	

The bus supply can be switched off manually via tool if not used. Transit power 24V AC

Field supply 24V AC	Max. 6VA
Field supply 24V DC (DXR2.E18 only)	Max. 2.4W
Digital output (triac active)	6VA (250mA)

Note: Certain applications ensure that only one triac at a time is active: No simultaneous heating and cooling. Two heating outputs are alternatively on 50% of the time, the same with two cooling outputs. This can be considered in the transformer sizing.

Unconfigured triac	6VA (250mA)
--------------------	-------------

Cable lengths 24V AC

The permissible voltage drop of 0.6 V on the power wire between the transformer and the most distant power point (room automation station, power module, bus interface module) is the basis for calculations.

Permissible load [VA]

		Cable length for 24V AC (Si)			
Cable X-section	2.5m	5.0m	10m	20m	50m
AWG16	200VA	100VA	50VA	25VA	10VA
AWG14	320VA	160VA	80VA	40VA	16VA
		Cable length for 24V AC (US)			
Cable X-section	8.2ft	16.4ft	32.8ft	65.6ft	164ft
AWG16	200VA	100VA	50VA	25VA	10VA
AWG14	320VA	160VA	80VA	40VA	16VA

Notes :

1. The supply wire (24V AC) and return lines can each have the indicated lengths.
2. Power is added together for multiple back-to-back looped PXC3 or DXR2 ("daisy chain") which reduces the cable length accordingly.
3. Each supply point (room automation stations/power module/bus interface module) is either connected separately to the transformer's terminal block (star wiring) or looped via the room automation station.
4. Cables may be wired in parallel to increase the cross section.

Wiring of field devices (without bus)

As a rule, comply with local regulations for electrical installations. These take precedence over any notes in this document.

Wiring for Triac outputs 24V AC.

The following applies for wiring to actuating devices such as valves, damper actuators or protection connected to the Triac outputs:

1. Use stranded, 2 or multiple core round cables, screened (standard off-the-shelf installation cable).
2. Single wires may not be used.
3. Wiring may be laid together with power lines (230V AC). They must be isolated from the power lines per regulations. Isolation must meet PELV requirements.
4. Wiring can not be led in the same cable as the power lines.
5. See table below for maximum single cable lengths. However, the length must not exceed 984ft (300m) (EM interference). DXR2: 262ft (80m).

DXR2 room automation stations with 24V AC supply:

1. Use cable cross section suited for 4A according to local regulations (T 4A fuse external / Class 2 transformer). Cable cross section >= AWG18. Triacs are not protected and are destroyed if overloaded.
2. Cable length <= 262ft (80m)

Signal wiring

The following applies in common for signal wiring of field devices such as temperature sensors, window switches, presence detectors, dew point sensors or electrical buttons:

1. Use stranded, 2 or multiple core round cables, without screen (standard off-the-shelf installation cable).
2. Single wires or ribbon cables may not be used.
3. Signal wiring may be laid together with power lines (230V AC). They must be isolated from the power lines per regulations. Isolation must meet PELV requirements.
4. Signal wiring can not be led in the same cable as the power lines.
5. The length must not exceed the following value (measuring errors, EM interference): DXR2: 262ft (80m).
6. All system neutral terminals of a device are interconnected. TX-/I/O: The connection is not in the terminal base but in the plug-in module. When this unit is unplugged there is no connection.
7. The system neutral of a digital input can be connected to any signal neutral terminal of the device.
8. It is also permissible to combine the system neutral conductors of several digital inputs in order to save wire. TX-/I/O: However, system ground must be connected at least once per module.
9. With analog inputs and outputs, the measuring neutral must always be connected to the terminal associated with that specific I/O point to avoid possible measurement errors.
10. 0 to 10V DC actuators with 0 to 10V DC feedback: System neutral of output and feedback may be in the same conductor due to the small current of the UI0 and YI0 signals. However, output and feedback must be on the same device and there is no 24V DC supply current admissible on the system neutral conductor.

Relay outputs

1. External fuse of max. 10A for protection of the PCB tracks.
2. Relays have volt-free relay contacts. The mains voltage / switching voltage (230V AC / 24V AC/DC) must be supplied as an external voltage to the terminals.
3. The maximum load of the relay contracts must be observed (see data sheets for the corresponding devices)
4. The sizing and fusing of the power lines are oriented to overall connected load and local regulations.
5. The fused electrical values must therefore be reviewed in the data sheets for the corresponding devices.
6. The lines must be secured on the device with strain relief.
7. Cable length: as per load and local regulations.
8. The maximum current of the relays is limited to 4 (3)A.

Inputs and Outputs

Digital inputs

Cable length

The permissible length of the cables connected to the status contacts, regardless of the thickness of the wire (min. diameter 0.024in / 0.6mm) is restricted to 262ft (80m).

Common conductor with multiple contacts:

When several status or counter contacts are to be connected, a common conductor may be used. This saves wiring. However, system ground must be connected at least once per module. Digital inputs are not electrically isolated from the system electronics. Mechanical contacts must be volt-free. Electronic switches must comply with SELV or PELV standards.

Analog inputs

Cable length:

The maximum permissible cable length for passive resistance sensors and transmitters depends on the permissible measuring error due to the line resistance. The maximum cable length for DXR2 is 262ft (80m).

Active sensors 0 - 10V DC

Cable length:

The maximum cable length for DXR2 is 262ft (80m). The permissible length of 10V DC cables for measured signals, and of the cables to supply the sensors from the TRA device, have to be calculated on the following basis for each active sensor.

1. Max. 7% voltage drop (1.68V) on the cables due to the sensor supply current. Reason: to ensure sufficient voltage for the sensor supply.
2. Measuring error of max. 0.5% of the measuring range due to line resistance on the measuring conductor (not critical, as the measuring current is only 0.1mA)
3. Longer cables are permissible provided larger measuring errors are acceptable.
4. If the active sensor is supplied locally from a transformer, the sensor cable can be up to 984ft (300m) long (DXR2: 262ft (80m)) with a wire diameter of greater than or equal to 0.024in (0.6mm). The local transformer MUST NOT be earthed (earth loop)!
5. In case of active sensors with 24V AC supply, use cable cross section suited for 10A according to local regulations .
- 6.

Digital outputs (relays, triacs)

Cable length:

The cable between the switching outputs and the equipment to be switched may be up to 262ft (80m) for DXR2.

The permissible lengths of the cables between the relay outputs / triacs and the actuators depend on the type of actuator in use and are calculated as follows:

1. Relays: Voltage drop of max. 7% (1.68V) on the 24V AC operating voltage for the actuator.
2. Triacs: Voltage drop of max. 3% (0.72V) on the 24V AC operating voltage for the actuator (the triac itself has already 4% voltage drop).

Analog outputs

Cable length

The permissible cable lengths for 0 - 10V DC control signals and for the 24V AC operating voltage are given in the data sheets of the individual actuators.

Where the actuators are supplied locally with 24V AC, the control signal cable may be up to 984ft (300m) long (DXR2: 262ft (80m)) with a diameter of greater than or equal to 0.024in (0.6mm).

The local transformer MUST NOT be earthed (earth loop)!

0 - 10V DC actuators with 0 - 10V DC feedback: System neutral of output and feedback may be in the same conductor due to the small current. However, output and feedback must be on the same device.

REVISION HISTORY

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GEOLOGY - FACULTY 100

IU PROJ #20250361,

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
WLH	WLH	BH	02/15/19	03/22/26

DXR Wiring Specification

440P-415245

DWIR1

Ethernet network:

Network topologies

- Star topology (general).
- Line topology (for room automation).
- DXR2 and PXC3 can be mixed.
- The number of room automation stations is limited to 20 for a line topology (daisy chain).
- The next device has no 24V AC power when a room automation station is removed. The connection exists only on the board, but not on the terminal block.
- The Ethernet switch is inactive when a room automation station has no 24V AC power. The next devices, if in line topology, are disconnected from the network. For secure operation of the system it is recommended to supply each room automation station separately with 24V AC.

Cables – Room automation stations are connected to one another via switches and Ethernet cables with RJ45 connectors. The following conditions must be met:

- Standard Ethernet cable min. category 5
- Shielded or unshielded STP (Shielded Twisted Pair) or UTP (Unshielded Twisted Pair).
- Length between switch and Room automation station max. 328ft (100m).
- Length between Room automation stations Max. 328ft (100m).
- Number of devices under a line topology max. 20.
- Standard IT product at 100MB or 1GB.

Power over Ethernet (PoE) – Power over Ethernet (PoE) is a simple solution to supply power to room operator units consuming only little power. This saves a power cable and associated installation costs. PoE allows for installing Ethernet devices also in hard-to-access locations or areas where too many cables are an issue. In PoE, power sourcing equipment (PSE) supplies power to powered devices (PD, here: end devices). Voltage is supplied via the RJ45 plugs and a twisted-pair cable (TP) to the devices either:

- Via data transmission lines
- Or via unused lines of the RJ45 connection.

PoE requires a star topology. Standard PoE switches have between 4 and 16 outputs. In large plants (e.g. different rooms in a hotel) require use of multiple switches in a line topology.

Specifications:
 Standard Ethernet cable min category 5
 Screened or unshielded STP / UTP
 STP (Shielded Twisted Pair) or UTP (Unshielded Twisted Pair)
 Distance between switch and station = max 328ft (100m).
 Distance between switch and end unit = max 328ft (100m).

MS/TP networks:

Network topologies – MS/TP networks for Desigo TRA can only be wired in line topology. The network distance for a fully or partially loaded network is 4000ft (1220m) at a maximum network speed of 76,800 bps. Lower speeds do not mean longer network sections are possible. DXR2 controller support up to 115,200 bps. Network repeaters can be used to extend this distance. To determine how many devices can be on a network section, add up all the loading numbers and do not exceed 32. Many third-party devices have full load interfaces. Check the manufacturer's literature for network loading information. The RS-485 specification allows 32 full load devices on a section of network cable before a repeater is required. Desigo TRA devices are 1/8 load devices, so, in theory, you could place 256 on a network section.

Response times normally limit the maximum number of devices on a network to lower values of around 96 devices.

- Two 120Ohm 1/4W resistors between + and - at BOTH ends of the network section.
- OneSpecial PTC thermistor between Reference () and earth at ONE end of the network section. This prevents the cable from being damaged by high ground currents that may occur if the reference wire is accidentally grounded to earth ground at a second location.

Technical data BACnet MS/TP – Inter-node protocol communications on BACnet MS/TP networks take place over RS-485 physical media. Desigo TRA devices use the 3-wire interface.

- By providing the RS-485 ground signal of the interface to the network termination plug, all node communication ports can be referenced together providing a high degree of noise immunity.
- The RS-485 common reference wire is terminated at one point (and only one point) to earth ground.
- An overall foil shield and drain wire provide additional noise protection.
- The decision to use the orange jacket cable or orange jacket with blue stripe cable is up to the user/customer. The only difference in the cables is the addition of the blue stripe, which can be useful to indicate a different protocol usage (e.g. Automatic level vs. floor level network).



Cable Specifications

Transmission medium	1.5-Pair (1 TP & 1 conductor) (bus cable) with overall Shield and drain wire
Gauge (pair)	24 AWG (0.25 mm ²) stranded
Capacitance	conductor to conductor 12.5 pF/foot (41 pF/m) conductor to shield 24 pF/foot (79 pF/m)
Impedance	120 Ohm
Twists	min. 4 per foot (13 per m)
Reference wire	24 AWG (0.25 mm ²) stranded, 3 inch lay with twisted pair
Shield	100% overall foil with drain wire
NEC class	UL listed, CM, CMP (167°F (75°C) or higher)
CEC class	FT4, FT6 (167°F (75°C) or higher)

KNX PL-Link room bus:

- The KNX PL-Link bus must be conducted inside the building. The cables must never leave the building.
- The KNX PL-Link bus facilities communications from the PXC3 room automation station to a maximum 64 devices on the KNX bus devices for various manufacturers.
- Note: The number of devices is also limited by the number of data points and the available bus power. Data points and bus power are incremented during engineering with the ABT tool.
- The KNX PL-Link bus basic version comprises one cable and two stranded bus wires.
- The PXC3 has one internal bus power supply of 160mA.
- The DXR2 has one internal bus power supply of 50mA.
- The PXC3 also includes an AC 24V / 2A output for devices with increased power consumption that is supplied via 24V AC rather than via the KNX PL-Link bus.
- The KNX PL-Link is physically based on the KNX bus (Konnex).
- In KNX networks area/line couplers and IP routers are not admitted.

10. Interconnection of room automation stations via KNX PL-Link is not admissible; the connection is done exclusively via Ethernet switches (Section 9).

11. The polarity of the KNX PL-Link bus conductors must be respected (KNX terminals + and -).

Bus power supply – A bus power supply is required for bus communications. Throttled voltage 29V DC is used.

Internal KNX PL-Link Power Supply:
 The room automation stations have an internal bus power supply, which is switched on by default. If an external supply is used, the internal supply must be switched off manually in the ABT (KNX PL-Link rail properties), as parallel operation is not permitted. Bus power and the KNX bus are electrically isolated from device electronics for devices with bus power. Parallel operation of the internal KNX PL-Link bus supply with an external bus power supply is not permitted. The internal bus power supply must be switched off in the tool when an external bus power supply is used.

External bus supply:
 An external bus power supply unit (PSU) is required when the 160mA of the PXC3 / the 50mA of the DXR2 is insufficient to cover the power demand of the connected devices. Power supply units for 160, 320 and 640mA available in specialty stores. The total power supply for the devices must be calculated to determine the appropriate size. Comply with the corresponding details in the datasheet. A 640mA power supply unit suffices for a line featuring 64 devices on the KNX bus with an average power demand of 10mA each.

(Parallel operation)
 In principle, parallel operation of external bus supplies among themselves is possible. However, check if the specific PSU is allowed to be operated in parallel with other PSUs. Refer to the technical specifications. The below mentioned Siemens devices are not submitted to this restriction.

6. A minimum cable distance is required between two PSU.

Bus topologies – Up to 64 devices with KNX PL-Link can be installed on one line (main line as well). No restrictions apply to the type mix.

- Note:**
- There is no need to calculate the bus load number E for up to 64 devices.
 - A maximum of 64 devices may be installed even if devices requiring less power are used.

Permissible bus topologies are: Tree, line, and star topologies. These topologies can be mixed as needed. However, **ring topologies are not allowed**. The tree topology is advantageous if a large network must be created.

Cables
 The bus lines (= wired pair) are connected via PL+ (red) and PL- (black).



24V AC can be provided in the same (2 x 2 stands) or in a separate cable.

Bus cable screening: In TRA plants, bus cables without screen are permitted. The screens available for bus cables do not need to be connected. If interference is expected on the KNX bus, use a cable with screen. Connect the screen as per standard installation rules.

Network with internal power supply: Comply with the following distances for a KNX network with the internal power supply from the room automation station:

- Distance between device and internal supply, max 262ft (80m).
- Distance between devices, max 262ft (80m).
- Total length of all lines on one line, max 262ft (80m).

Network with external power supply: Comply with the following distances for a KNX network with external bus power supply (PSU)

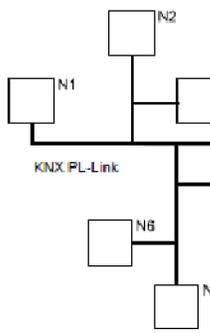
- Distance PSU to PXC3 with switched off internal supply, Min. 0ft (0m).
- Distance device to next PSU, Max. 1148ft (350m).
- Distance between two PSU operated in parallel Min. 656ft (200m), (Min. 0ft (0m) for the new Siemens power supply modules.).
- Distance between devices, Max. 2297ft (700m).
- Total length of all lines on one line, Max. 3281ft (1000m).

Polarity: Important! – The bus conductors must NOT be inverted. (KNX terminals + and -).

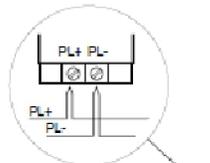
Permissible load [VA] :

AWG	Cable length for 24V AC			
	32.8ft	65.6ft	164ft	328ft
AWG20	48VA	30VA	12VA	6VA
AWG18	48VA	48VA	20VA	10VA
AWG16	48VA	48VA	32VA	16VA
AWG14	48VA	48VA	48VA	24VA

Tree topology (with stub lines)



Device with screw terminals



Permissible load [VA] (SI):

AWG	Cable length for AC 24V			
	10m	20m	50m	100m
AWG20	48VA	30VA	12VA	6VA
AWG18	48VA	48VA	20VA	10VA
AWG16	48VA	48VA	32VA	16VA
AWG14	48VA	48VA	48VA	24VA

KNX PL-Link Technical data
 KNX bus :

- Transmission medium (bus cable), TP (twisted pair)
- Baud rate, 9.6 kbps (fixed for TP)
- Bus line polarity, PL+, PL- (not interchangeable)
- Bus terminating resistor, Not required.

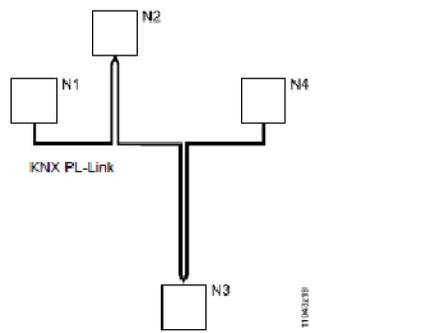
KNX bus cable:

- Cable type, 18AWG two conductor, solid, communication cable (Belden 6320FE877 or similar).
- Wire diameter, Min. 0.8 mm (AWG20), Max. 1.0 mm (AWG18).
- Line resistance, 20 to 75 Ω/km.
- Specific capacity, 10 to 100 nF/km at 10 kHz.
- Specific inductivity, 450 to 850 μH/km at 10 kHz.
- Screens, Not required.

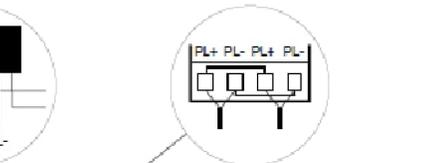
Bus power supply: DXR2 is 30V DC, 50mA for max. 5 KNX devices with 10mA each.

Max. number of devices: 64 devices in a KNX PL-Link network.

Line topology (with loops)



Device with spring cage terminals



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DXR Wiring Specification2

440P-415245

DWIR2

NOTE: CIC TO MAINTAIN MSTP FLN TRUNK AND POWER TRUNK DURING DEMO AND CONSTRUCTION. COORDINATE WITH SIEMENS PRIOR TO MAKING FLN CHANGES.

REMOVE EXISTING VAV BOX COMPLETE. SAVE CONTROLLER FOR REINSTALLATION

- TU 1.26 Existing Thermostat to remain. Connect to existing relocated VAV Box.
- TU 1.28 Existing Thermostat to remain. Connect to existing relocated VAV Box.
- TU 1.29 Existing Thermostat to remain. Connect to existing relocated VAV Box.
- TU 1.31 Existing Thermostat to remain. Connect to new replacement VAV Box. (ALT-1)
- TU 1.32 Existing Thermostat to remain. Connect to new replacement VAV Box. (ALT-1)
- TU 1.33 Existing Thermostat to remain. Connect to new replacement VAV Box. (ALT-1)
- TU 1.34 Existing Thermostat to remain. Connect to new replacement VAV Box. (ALT-1)
- TU 2.31 Existing Thermostat to remain. Connect to new replacement VAV Box.
- TU 3.25 Remove Existing Thermostat & Associated Wiring. Save for Reinstallation.
- TU 3.26 Remove Existing Thermostat & Associated Wiring. Save for Reinstallation.
- TU 3.27 Remove Existing Thermostat & Associated Wiring. Save for Reinstallation.
- TU 3.28 Remove Existing Thermostat & Associated Wiring. Save for Reinstallation.
- TU 3.29 Remove Existing Thermostat & Associated Wiring. Save for Reinstallation.
- TU 4.38 Existing Thermostat to remain. Connect to existing relocated VAV Box.
- TU 6.0 Remove Existing Thermostat & Associated Wiring. Save for Reinstallation.

EXISTING VAV TO REMAIN

- TU 1.25 NO CHANGE
- TU 1.27 NO CHANGE
- TU 1.30 Duct Change only
- TU 4.30 Duct Change only
- TU 4.31 Duct Change only
- TU 4.32 Duct Change only
- TU 4.33 Duct Change only
- TU 4.37 Duct Change only
- TU 4.39 Duct Change only
- TU 5.21 Remove Existing Thermostat & Associated Wiring. Save for Reinstallation.

ALT-1: ALL WORK WITH ROOMS 1005 AND 1011 SHALL BE BID AS PART OF ALTERNATE #1. AS PART OF BASE BID, FOR THE AIR TERMINAL UNITS NOTED AS "NEW OR EXISTING TU-1.32, 1.33 OR 1.34", PROVIDE A NEW VAV BOX. AS PART OF ALTERNATE #1.

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DEMOLITION PLAN

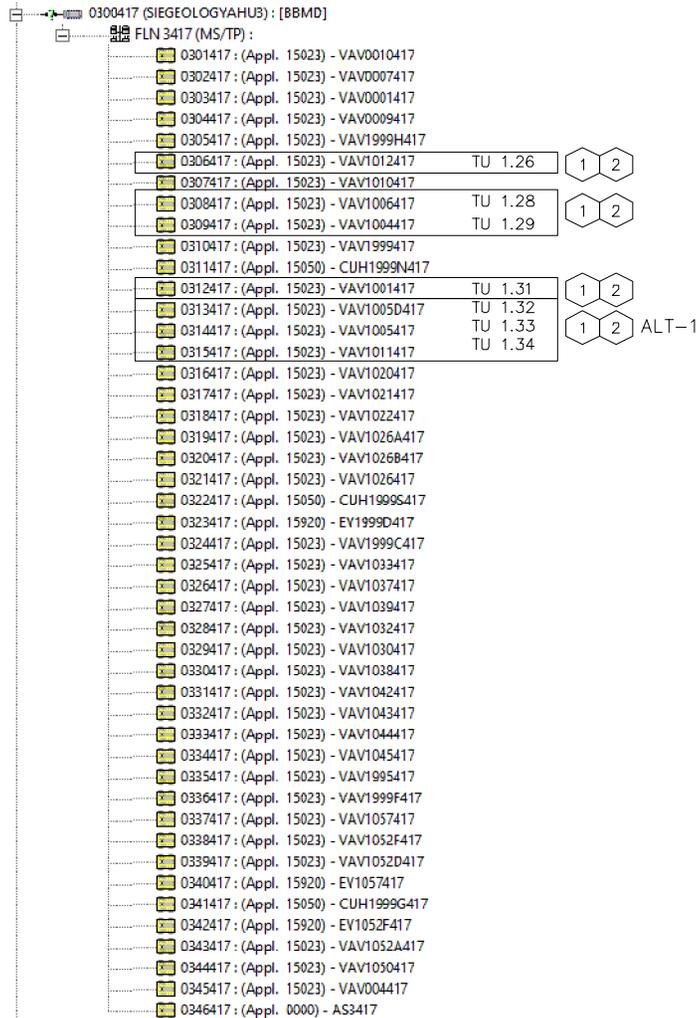
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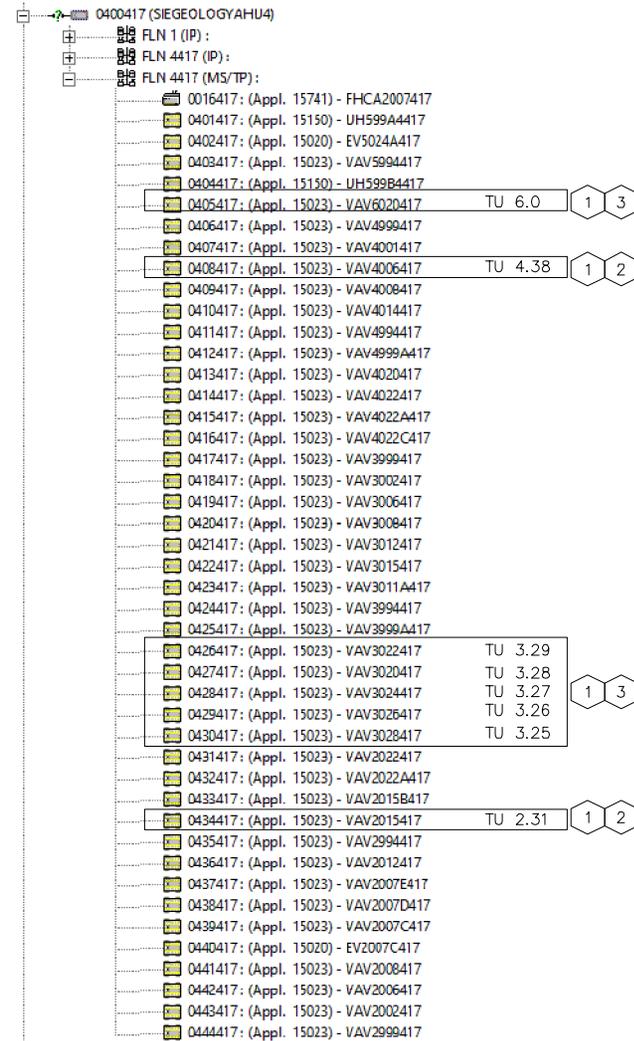
INSTALLATION NOTES:

- 1 REMOVE EXISTING VAV BOX COMPLETE. SAVE CONTROLLER FOR REINSTALLATION.
- 2 EXISTING THERMOSTAT TO REMAIN AND RECONNECT TO VAV SERVING SPACE.
- 3 REMOVE EXISTING THERMOSTAT AND WIRING. SAVE FOR REINSTALLATION.

PXCM-3 (AHU-3) MSTP TRUNK



PXCM-4 (AHU-4) MSTP TRUNK



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DEMOLITION PLAN

440P-415245

002

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
PWR	6	1	PSH500A	FUNCTIONAL DEVICES	1208cut143 PS FIVE 100VA C2 120-24VAC ENC

ROOM	DESCRIPTION	MARK	FROM	EXHAUST	FROM	FLN	CONTROLLER
1004	TA WORKSTATION	TU-1.38	NEW/TU-1.34	N/A	N/A	MSTP FLN 3	VAV1004417
1005	(ALT-1) TEACHING LAB	TU-1.39	TU-6.0	N/A	N/A	MSTP FLN 3	VAVA1005417
		TU-1.40	NEW	N/A	N/A	MSTP FLN 3	VAVB1005417
		N/A	N/A	EV-1.4	NEW	MSTP FLN 3	EV1005417
1006	LAB SUPPORT	TU-1.41	TU-2.31	EV-1.5	NEW	ETHERNET FLN	RPC1006417
1011	(ALT-1) TEACHING LAB	TU-1.42	NEW	EV-1.6	NEW	ETHERNET FLN	LRC1011417
		N/A	N/A	FEV-1.1	NEW	ETHERNET FLN	FHCA1011417
		N/A	N/A	FEV-1.2	NEW	ETHERNET FLN	FHCB1011417
		N/A	N/A	FEV-1.3	NEW	ETHERNET FLN	FHCC1011417
1012	CELL CULTURE	TU-1.43	TU-3.26	EV-1.7	NEW	ETHERNET FLN	RPC1012417
1014	LAB SUPPORT	TU-1.44	TU-3.28	EV-1.8	NEW	ETHERNET FLN	RPC1014417
1999D	LOADING DOCK	CUH-4	N/A	N/A	NEW	MSTP FLN	CUH1999D417
2015	OPTICS	TU-2.42	NEW	EV-2.9	NEW	ETHERNET FLN	RPC2015417
2015A	WET LAB	TU-2.43	NEW/TU-1.33	EV-2.7	NEW	ETHERNET FLN	RPC2015A417
2015B	DRY LAB	TU-2.30	EXISTING	N/A	N/A	MSTP FLN 4	VAV2015B417
		N/A	N/A	EV-2.8	NEW	MSTP FLN 4	EV2015B417
3021	ROBOTICS LAB	TU-3.48	NEW	N/A	N/A	MSTP FLN 4	VAV3021417
4002	CELL CULTURE	TU-4.39	EXISTING	EV-4.10	NEW	ETHERNET FLN	RPC4002417
4004	CELL CULTURE	TU-4.51	TU-3.25	EV-4.11	NEW	ETHERNET FLN	RPC4004417
4006	CELL CULTURE	TU-4.38	TU-1.26	EV-4.12	NEW	ETHERNET FLN	RPC4006417
4008	CELL CULTURE	TU-4.37	EXISTING	EV-4.13	NEW	ETHERNET FLN	RPC4008417
4010	OFFICE	TU-4.52	TU-3.27	N/A	N/A	MSTP FLN 4	VAV4010417
4022	PASSAGE/WORK	TU-4.32	EXISTING	N/A	N/A	MSTP FLN 4	VAV4022417
4022A	OFFICE	TU-4.49	TU-1.28	N/A	N/A	MSTP FLN 4	VAV4022A417
4022B	CLEAN FAB	TU-4.33	EXISTING	N/A	N/A	MSTP FLN 4	VAV4022B417
4022C	MECHANICS FAB	TU-4.50	TU-3.29	N/A	N/A	MSTP FLN 4	VAV4022C417
4022D	ELEC FABRICATION	TU-4.31	EXISTING	N/A	N/A	MSTP FLN 4	VAV4022D417
4022E	S. MEASUREMENT	TU-4.30	EXISTING	N/A	N/A	MSTP FLN 4	VAV4022E417
5024	DRY LAB	TU-5.21	EXISTING	N/A	N/A	MSTP FLN 4	VAV5024417
5024A	DRY LAB SUPPORT	TU-5.24	NEW/TU-1.32	N/A	N/A	MSTP FLN 4	VAV5024A417
5024B	DRY LAB SUPPORT	TU-5.25	TU-1.29	N/A	N/A	MSTP FLN 4	VAV5024B417
6020	DRY LAB	TU-6.0	NEW	N/A	N/A	MSTP FLN 4	VAV6020417

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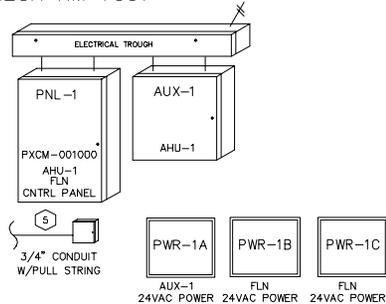
SYSTEM ARCHITECTURE

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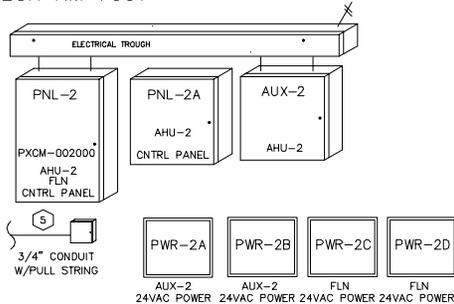
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LVL 07

MECH RM 7997 120 VAC



MECH RM 7997 120 VAC



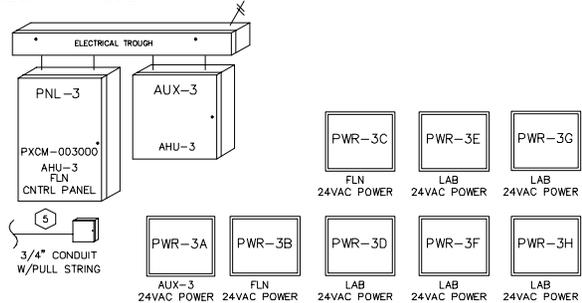
INSTALLATION NOTES:

- 1 REFER TO PLANS FOR MORE DETAIL ON CONTROL PANEL LOCATIONS.
- 2 POWER TO IDC PANELS BY DIVISION 26 ELECTRICAL AS STATED IN CONTRACT DOCUMENTS. POWER THAT IS NOT INDICATED IN CONTRACT DOCUMENTS BUT IS REQUIRED FOR BUILDING AUTOMATION SYSTEM (BAS) SHALL BE THE RESPONSIBILITY OF THE CONTROLS INSTALLATION CONTRACTOR (CIC).
- 3 CIC TO PROVIDE BARRIER FOR SEPARATION WITHIN THE ELECTRIC TROUGH OF LOW VOLTAGE WIRE AND 120V POWER WIRING.
- 4 REFER TO TX-1/0 WIRING SPECIFICATION DRAWING TWR FOR PXCM COMMUNICATION TERMINATION DETAILS.
- 5 CIC TO PROVIDE A DEDICATED 3/4" CONDUIT WITH A PULL STRING FROM IDF/MEF ROOM TO A JUNCTION BOX (MINIMUM 6"x6"x4") LOCATED NEXT TO SIEMENS PANEL WITH A RACEWAY FOR PATCH CABLE CONNECTION TO PXCM CONTROLLER. COORDINATE WITH IU FOR LOCATION OF IDF/MEF ROOM.
- 6 EXISTING CHWS PANEL FLASH PANEL TO BACNET AND CONNECT TO OWNER PROVIDED P DROP.

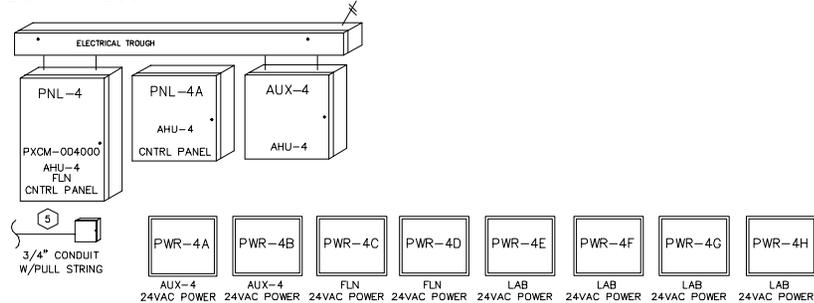
LVL 06

LVL 05

MECH RM 5994 120 VAC

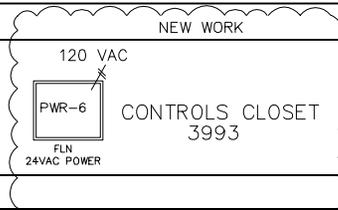


MECH RM 5994 120 VAC



LVL 04

LVL 03

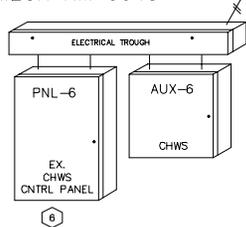


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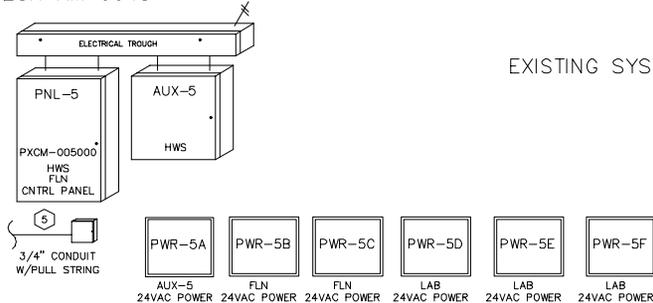
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MECH RM 0045 120 VAC



MECH RM 0045 120 VAC



EXISTING SYSTEM ARCHITECTURE FOR REFERENCE.

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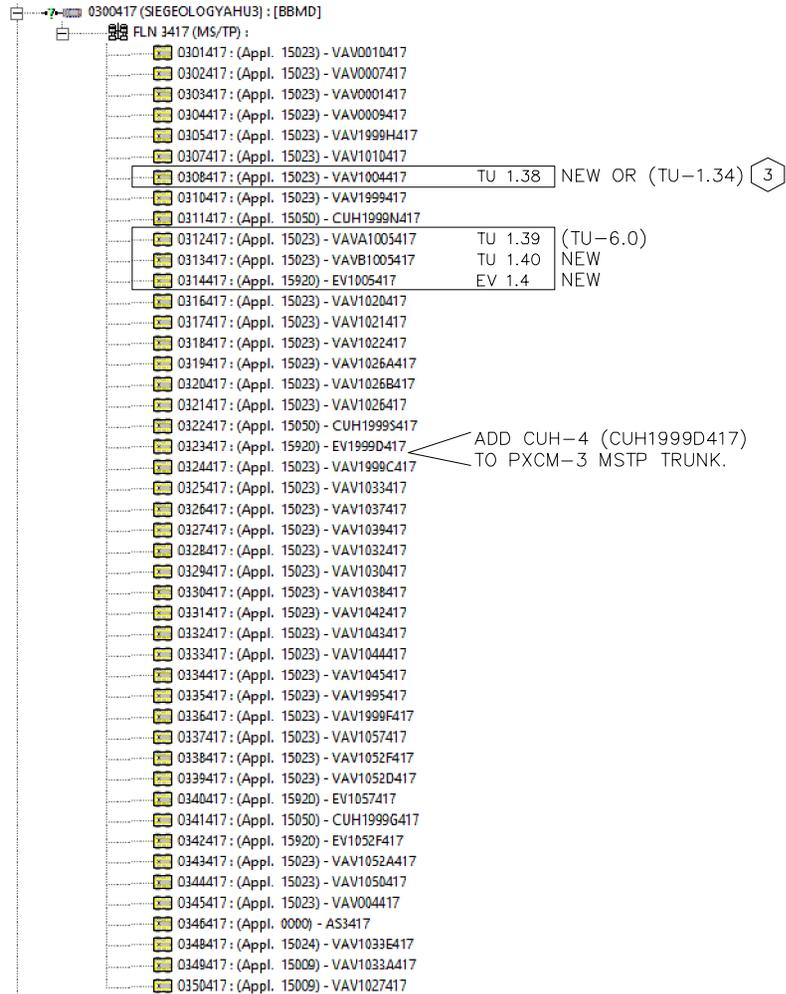
SYSTEM ARCHITECTURE

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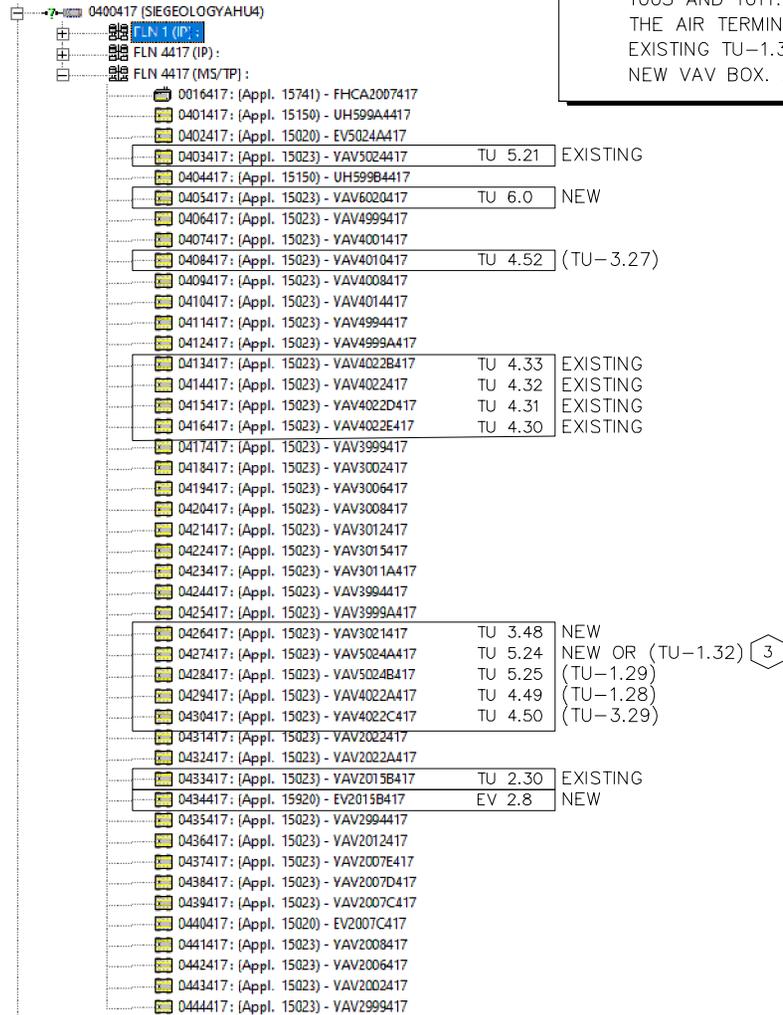
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RECONNECT EXISTING FLN AND POWER TRUNK

PXCM-3 (AHU-3) MSTP TRUNK



PXCM-4 (AHU-4) MSTP TRUNK



INSTALLATION NOTES:

- 1 ALL SUPPLY AIR TERMINAL UNITS SHOWN AS (TU-###) ARE EXISTING UNITS THAT ARE TO BE RELOCATED.
- 2 FOR ALL EXISTING UNITS, REBALANCE HOT WATER FLOW RATES TO NEW VALUES SHOWN AND REPROGRAM BOX AIRFLOWS TO VALUES SHOWN.
- 3 ALTERNATE #1 SHALL INCLUDE ALL WORK FOR 1005 AND 1011. AS PART OF BASE BID, FOR THE AIR TERMINAL UNITS NOTED AS "NEW OR EXISTING TU-1.32, 1.33 OR 1.34", PROVIDE A NEW VAV BOX. AS PART OF ALTERNATE #1.

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MSTP FLN TRUNKS

440P-415245

005

INSTALLATION NOTES:

- 1 SIEMENS FLOOR LEVEL NETWORK CABLE TO BE CONNECTED TO AN ETHERNET SWTCH (SW-1) LOCATED IN THE AUX PANEL IN 3933.
- 2 POWER TRUNK XFMR TO BE LOCATED PER CONTRACT DOCUMENTS. 120V POWER PROVIDED BY E.C. MOUNTING AND FIELD WIRING BY C.I.C.

EXISTING ETHERNET LAB FLN TRUNKS

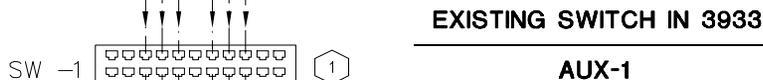
EXISTING ETHERNET LAB FLN TRUNKS

LOOP	UNIT TYPE	UNIT NUM	LEVEL	AHU	PRINT	ROOM NUM	ROOM DESC	POWER SUPPLY
1	TU	1.41	1ST	4	H201	1006	LAB SUPPORT	6 CKT 1
1	TU	1.42	1ST	4	H201	1011	TEACHING LAB (ALT-1)	6 CKT 2
1	FEV	1.1	1ST	4	H201	1011	TEACHING LAB (ALT-1)	6 CKT 2
1	FEV	1.2	1ST	4	H201	1011	TEACHING LAB (ALT-1)	6 CKT 3
1	FEV	1.3	1ST	4	H201	1011	TEACHING LAB (ALT-1)	6 CKT 3
1	TU	1.43	1ST	4	H201	1012	CELL CULTURE	6 CKT 1
1	TU	1.44	1ST	4	H201	1014	LAB SUPPORT	6 CKT 1
1	TU	2.42	2ND	4	H202	2015	OPTICS	6 CKT 4
1	TU	2.43	2ND	4	H202	2015A	WET LAB	6 CKT 4

LOOP	UNIT TYPE	UNIT NUM	LEVEL	AHU	PRINT	ROOM NUM	ROOM DESC	POWER SUPPLY
2	TU	4.39	4TH	4	H204	4002	CELL CULTURE	6 CKT 5
2	TU	4.51	4TH	4	H204	4004	CELL CULTURE	6 CKT 5
2	TU	5.38	4TH	4	H204	4006	CELL CULTURE	6 CKT 5
2	TU	4.37	4TH	4	H204	4008	CELL CULTURE	6 CKT 5

4002	CELL CULTURE	TU-4.39	(EXISTING)	EV-4.10	(NEW)
4004	CELL CULTURE	TU-4.51	(TU-3.25)	EV-4.11	(NEW)
4006	CELL CULTURE	TU-4.38	(TU-1.26)	EV-4.12	(NEW)
4008	CELL CULTURE	TU-4.37	(EXISTING)	EV-4.13	(NEW)

1006	LAB SUPPORT	TU-1.41	(TU-2.31)	EV-1.5	(NEW)
1011	TEACHING LAB	TU-1.42	(NEW)	EV-1.6	(NEW) ALT-1
		N/A	N/A	FEV-1.1	(NEW) ALT-1
		N/A	N/A	FEV-1.2	(NEW) ALT-1
		N/A	N/A	FEV-1.3	(NEW) ALT-1
1012	CELL CULTURE	TU-1.43	(TU-3.26)	EV-1.7	(NEW)
1014	LAB SUPPORT	TU-1.44	(TU-2.38)	EV-1.8	(NEW)
2015	OPTICS	TU-2.42	(NEW)	EV-2.9	(NEW)
2015A	WET LAB	TU-2.43	(NEW OR TU-1.33)	EV-2.7	(NEW)



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ETHERNET FLN TRUNKS

440P-415245

006

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 5-6	2	FBUM	N/A	N/A	FURNISHED BY UNIT MFG
AE 7	1	GCA161.IU	SIEMENS	154001	MOD(V) SR,24V, MED.
RIB 5-6	2	RIBU1C	FUNCTIONAL DEVICES	N/A	RIB 120VAC 24VAC/DC SPDT
VFD 1C	1	FBO	N/A	N/A	FURNISHED BY OTHERS
Panel Mounted Devices					
RE 5	1	RH2B-U-AC24V-KIT	IDEC	1202cut016	RELAY&SOC,GP DPDT AC24V 10A
RE 1A	1	RH2B-U-AC24V-KIT	IDEC	1202cut016	RELAY&SOC,GP DPDT AC24V 10A

HRC-3 Bypass Damper Control Sequence

1. Open the heat recovery bypass damper whenever the heat recovery glycol pump is off (43-78 Deg F OAT). If the heat recovery glycol pump is on, modulate the bypass damper as needed to maintain the exhaust duct static pressure setpoint if the exhaust fan output is 100%.

Add LEF-1C to existing exhaust fan system and a bypass damper around the heat recovery coil 3.

LEF-1 Control Sequence

- A. Exhaust Fan Control
 1. Exhaust fan VFD shall modulate fan speed to maintain duct static pressure set point as measured by duct static pressure sensor.
 2. Airflow monitoring station will measure airflow of the fan. VFD or the nozzle controller will report this value to BAS.
- B. Nozzle Control
 1. System will maintain a minimum of 3,000 fpm velocity (adjustable) at the outlet of the fan, based on airflow monitoring station.
 2. BAS to monitor nozzle actuator feedback and the nozzle alarm and keep fan above the minimum required set point to maintain velocity.
 3. As fan speed increases, nozzle will modulate to increase nozzle open area. As fan speed decreases, nozzle will modulate to decrease nozzle open area.
- C. Bypass Damper
 1. If nozzle actuator is closed to a minimum and fan speed is at a minimum, then bypass damper to modulate open to maintain maximum -2" duct static pressure.
- D. Isolation Damper
 1. Isolation damper shall close when exhaust fan is indexed off.
 2. Isolation damper shall open when exhaust fan is indexed on. Fan shall not energized until end switch has been satisfied.
- E. Safeties
 1. VFD to alarm BAS if fan fails to operate.
 2. If VFD failure is detected (alarm mode), the VFD can manually be indexed to bypass. Confirm that the bypass dampers are open prior to starting the VFD in bypass mode. Nozzle area shall increase proportional to fan airflow until fan is at maximum speed. Duct pressure control will modulate bypass damper as required if system is in alarm mode.
 3. Exhaust fan shall shut down and system shall go into alarm if the exhaust fan high static pressure sensor reads a negative static pressure less than 4.0".

REVISION HISTORY

SIEMENS

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Indianapolis, IN 46268
USA
Phone: 317-293-8880
Fax: 866-814-3089

GEOLOGY - FACULTY 100

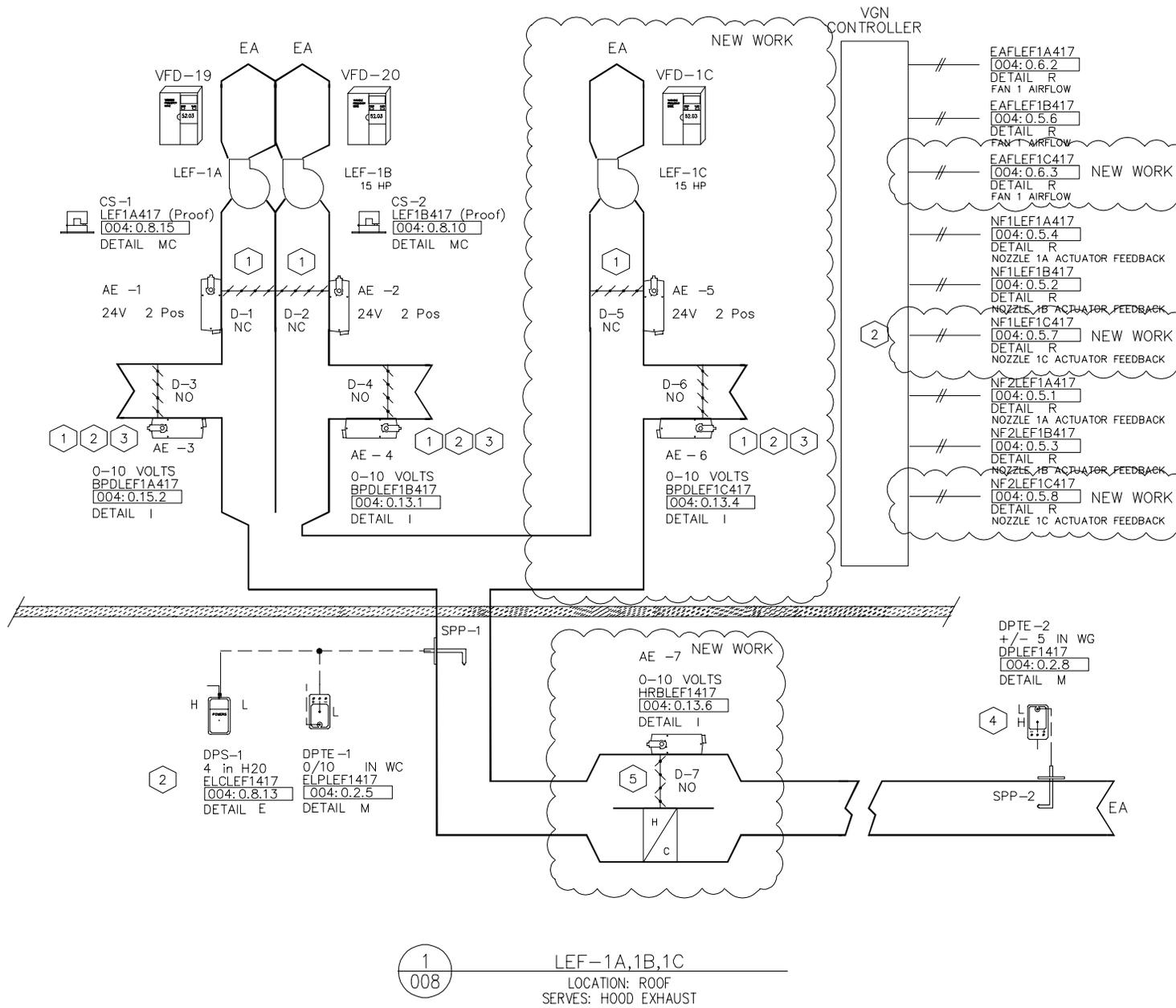
IU PROJ #20250361,

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
WLH	WLH		02/15/19	03/20/26

LEF-1 A-C CONTROL SYSTEM

440P-415245

007



- INSTALLATION NOTES:**
- 1 DAMPER AND ACTUATOR PROVIDED BY UNIT MANUFACTURER.
 - 2 PREPURCHASED EQUIPMENT BY I.U. REFER TO GREENHECK INSTALLATION INSTRUCTIONS FOR MOUNTING AND WIRING DETAILS.
 - 3 BEFORE STARTING EF IN BYPASS, CONFIRM THAT THE BYPASS DAMPERS ARE OPEN.
 - 4 PLACE DUCT STATIC PRESSURE SENSOR 2/3 OF THE WAY DOWN THE LONGEST OR CRITICAL DUCT.COORDINATE WITH OWNER FOR EXACT LOCATION.
 - 5 BYPASS DAMPER PROVIDED BY M.C. ACTUATOR PROVIDED BY SIEMENS.

VFD-19	VFD-20
<p>RIB-1 <input type="checkbox"/> SAFETY RELAY</p> <p>RIB-2 <input type="checkbox"/> LEF1A417 (On/Off) [004:0.11.6] DETAIL B</p> <p>DSLEF1A417 [004:0.15.7] DETAIL I SPEED</p> <p>DFLEF1A417 [004:0.8.16] DETAIL E FAULT</p> <p>KWLEF1A417 [004:0.6.1] DETAIL I MOTOR POWER</p>	<p>RIB-3 <input type="checkbox"/> SAFETY RELAY</p> <p>RIB-4 <input type="checkbox"/> LEF1B417 (On/Off) [004:0.12.1] DETAIL B</p> <p>DSLEF1B417 [004:0.15.8] DETAIL I SPEED</p> <p>DFLEF1B417 [004:0.8.12] DETAIL E FAULT</p> <p>KWLEF1B417 [004:0.5.5] DETAIL I MOTOR POWER</p>

VFD-1C NEW WORK

<p>RIB-5 <input type="checkbox"/> SAFETY RELAY</p> <p>RIB-6 <input type="checkbox"/> LEF1C417 (On/Off) [004:0.12.2] DETAIL B</p> <p>DSLEF1C417 [004:0.13.5] DETAIL I SPEED</p> <p>DFLEF1C417 [004:0.8.14] DETAIL E FAULT</p>	<p>LEF1C417 (Proof) [004:0.8.11] DETAIL E PROOF</p> <p>KWLEF1C417 [004:0.6.4] DETAIL I MOTOR POWER</p>
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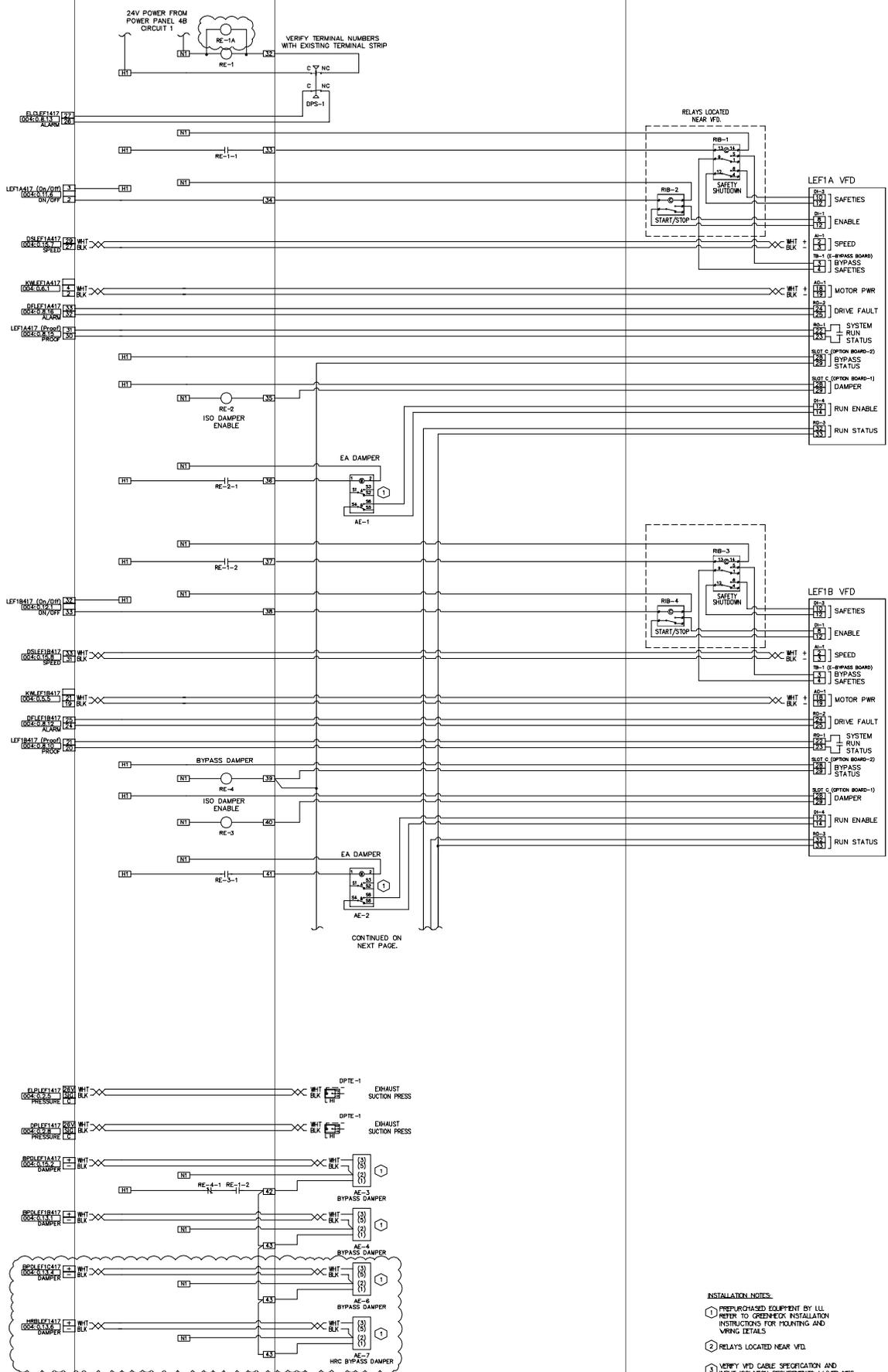
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LEF-1 A-C CONTROL SYSTEM

440P-415245

008



CONTINUED ON NEXT PAGE.

- INSTALLATION NOTES:
1. PREPURCHASED EQUIPMENT BY ILL REFER TO GREENPEAK INSTALLATION INSTRUCTIONS FOR MOUNTING AND WIRING DETAILS.
 2. RELAYS LOCATED NEAR VFD.
 3. VERIFY VFD CABLE SPECIFICATION AND INPUT ISOLATION REQUIREMENTS w/VFD FIG.
 4. EXACT LOCATION OF FIELD DEVICES TO BE COORDINATED WITH IUES/SERVIS.
 5. ALL WIRING TO MEET REQUIREMENTS OF STANDARD WIRING SPECIFICATIONS DRAWINGS.
 6. 5 AND 8 PIN CABLES PROVIDED FURNISHED BY UNIT MANUFACTURER.

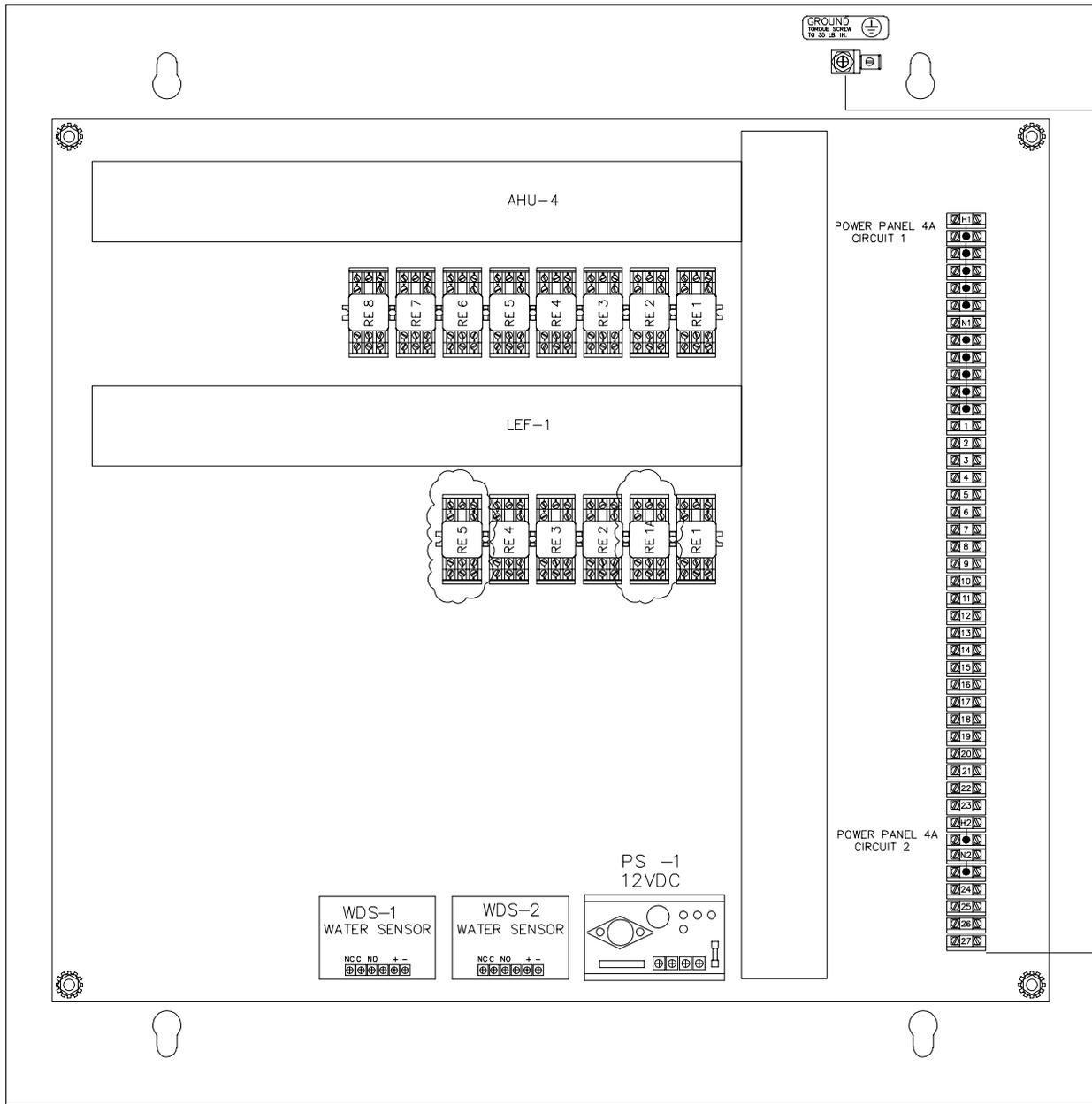
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GEOLOGY - FACULTY 100
 IU PROJ #20250861,
 ENGINEER: DRAPTER CHECKED BY: INITIAL RELEASE: LAST EDIT DATE: 02/15/19 03/19/26
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LEF-1 A-C CONTROL SYSTEM

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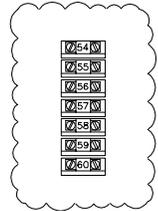
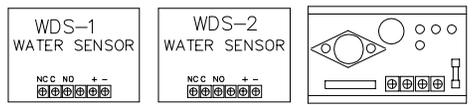
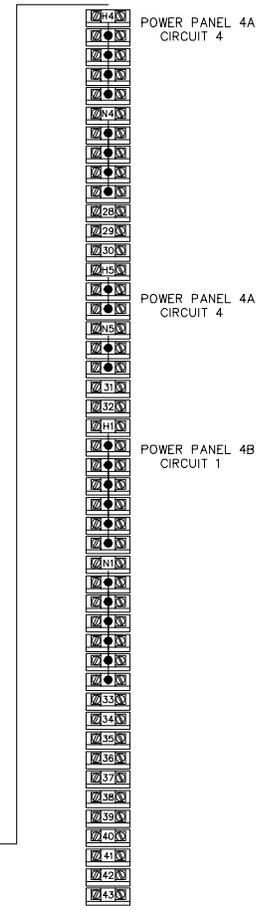
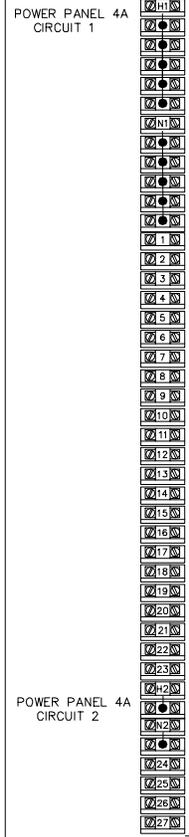
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PANEL GROUND LUG

ADDITIONS TO EXISTING AHU-2 AUX PANEL ARE CLOUDED.



1 AHU COMPONENT PANEL
011 LOCATION: REFER TO FLOOR PLAN

REVISION HISTORY

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LEF-1 A-C CONTROL SYSTEM

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE	7	GCA161.IU	SIEMENS	154001	MOD(V) SR,24V, MED.

Add a bypass damper around the heat recovery coil 1.

LEF-4 Control Sequence

A. Exhaust Fan Control

1. Exhaust fan VFD shall modulate fan speed to maintain duct static pressure set point as measured by duct static pressure sensor.
2. Airflow monitoring station will measure airflow of the fan. VFD or the nozzle controller will report this value to BAS.

B. Nozzle Control

1. System will maintain a minimum of 3,000 fpm velocity (adjustable) at the outlet of the fan, based on airflow monitoring station.
2. BAS to monitor nozzle actuator feedback and the nozzle alarm and keep fan above the minimum required set point to maintain velocity.
3. As fan speed increases, nozzle will modulate to increase nozzle open area. As fan speed decreases, nozzle will modulate to decrease nozzle open area.

C. Bypass Damper

1. If nozzle actuator is closed to a minimum and fan speed is at a minimum, then bypass damper to modulate open to maintain maximum -2" duct static pressure.

D. Isolation Damper

1. Isolation damper shall close when exhaust fan is indexed off.
2. Isolation damper shall open when exhaust fan is indexed on. Fan shall not energized until end switch has been satisfied.

E. Safeties

1. VFD to alarm BAS if fan fails to operate.
2. If VFD failure is detected (alarm mode), the VFD can manually be indexed to bypass. Confirm that the bypass dampers are open prior to starting the VFD in bypass mode. Nozzle area shall increase proportional to fan airflow until fan is at maximum speed. Duct pressure control will modulate bypass damper as required if system is in alarm mode.
3. Exhaust fan shall shut down and system shall go into alarm if the exhaust fan high static pressure sensor reads a negative static pressure less than 4.0".

HRC-1 Bypass Damper Control Sequence

1. Open the heat recovery bypass damper whenever the heat recovery glycol pump is off (43-78 Deg F OAT). If the heat recovery glycol pump is on, modulate the bypass damper as needed to maintain the exhaust duct static pressure setpoint if the exhaust fan output is 100%.

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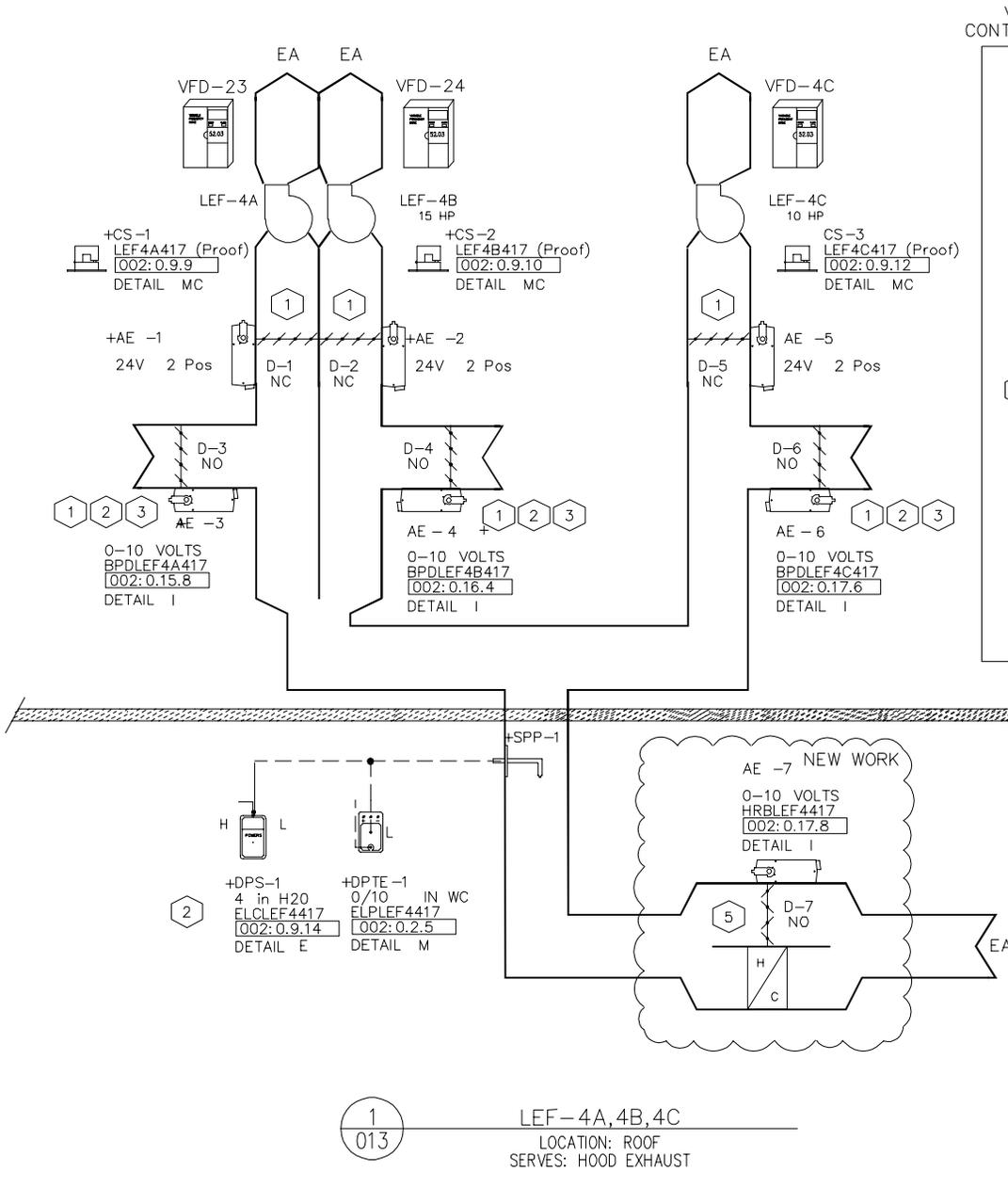
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LEF-4 A-C CONTROL SYSTEM

440P-415245

012



VGN CONTROLLER

- 1 // EAFLEF4A417 [002:0.5.4] DETAIL R FAN 1 AIRFLOW
- 1 // EAFLEF4B417 [002:0.5.6] DETAIL R FAN 1 AIRFLOW
- 1 // EAFLEF4C417 [002:0.7.4] DETAIL R FAN 1 AIRFLOW
- 1 // NCALEF4417 [002:0.9.11] DETAIL E ALARM
- 1 // NF1LEF4A417 [002:0.6.1] DETAIL R NOZZLE 4A ACTUATOR FEEDBACK
- 1 // NF1LEF4B417 [002:0.5.3] DETAIL R NOZZLE 4B ACTUATOR FEEDBACK
- 1 // NF1LEF4C417 [002:0.7.2] DETAIL R NOZZLE 4C ACTUATOR FEEDBACK
- 1 // NF2LEF4A417 [002:0.5.2] DETAIL R NOZZLE 4A ACTUATOR FEEDBACK
- 1 // NF2LEF4B417 [002:0.5.1] DETAIL R NOZZLE 4B ACTUATOR FEEDBACK
- 1 // NF2LEF4C417 [002:0.7.3] DETAIL R NOZZLE 4C ACTUATOR FEEDBACK

- INSTALLATION NOTES:**
- 1 DAMPER AND ACTUATOR PROVIDED BY UNIT MANUFACTURER.
 - 2 PREPURCHASED EQUIPMENT BY I.U. REFER TO GREENHECK INSTALLATION INSTRUCTIONS FOR MOUNTING AND WIRING DETAILS.
 - 3 BEFORE STARTING EF IN BYPASS, CONFIRM THAT THE BYPASS DAMPERS ARE OPEN.
 - 4 PLACE DUCT STATIC PRESSURE SENSOR 2/3 OF THE WAY DOWN THE LONGEST OR CRITICAL DUCT.COORDINATE WITH OWNER FOR EXACT LOCATION.
 - 5 BYPASS DAMPER PROVIDED BY M.C. ACTUATOR PROVIDED BY SIEMENS.

VFD-23	VFD-24	VFD-4C
<input type="checkbox"/> + RIB-1 SAFETY RELAY <input type="checkbox"/> +RIB-2 LEF4A417 (On/Off) DETAIL B <input type="checkbox"/> DSLEF4A417 [002:0.14.7] DETAIL I SPEED <input type="checkbox"/> DFLEF4A417 [002:0.9.13] DETAIL E FAULT <input type="checkbox"/> KWLEF4A417 [002:0.5.7] DETAIL I MOTOR POWER	<input type="checkbox"/> + RIB-3 SAFETY RELAY <input type="checkbox"/> +RIB-4 LEF4B417 (On/Off) DETAIL B <input type="checkbox"/> DSLEF4B417 [002:0.14.8] DETAIL I SPEED <input type="checkbox"/> DFLEF4B417 [002:0.9.15] DETAIL E FAULT <input type="checkbox"/> KWLEF4B417 [002:0.5.5] DETAIL I MOTOR POWER	<input type="checkbox"/> RIB-5 SAFETY RELAY <input type="checkbox"/> RIB-6 LEF4C417 (On/Off) DETAIL B <input type="checkbox"/> DSLEF4C417 [002:0.17.7] DETAIL I SPEED <input type="checkbox"/> DFLEF4C417 [002:0.9.16] DETAIL E FAULT <input type="checkbox"/> KWLEF4C417 [002:0.7.5] DETAIL I MOTOR POWER

1
013 LEF-4A, 4B, 4C
LOCATION: ROOF
SERVES: HOOD EXHAUST

REVISION HISTORY

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LEF-4 A-C CONTROL SYSTEM

013

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014

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IU PROJ #20250361,

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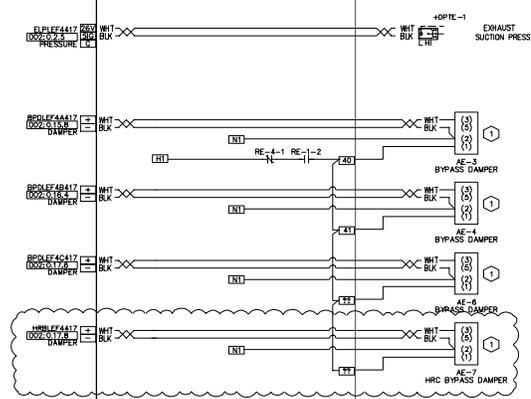
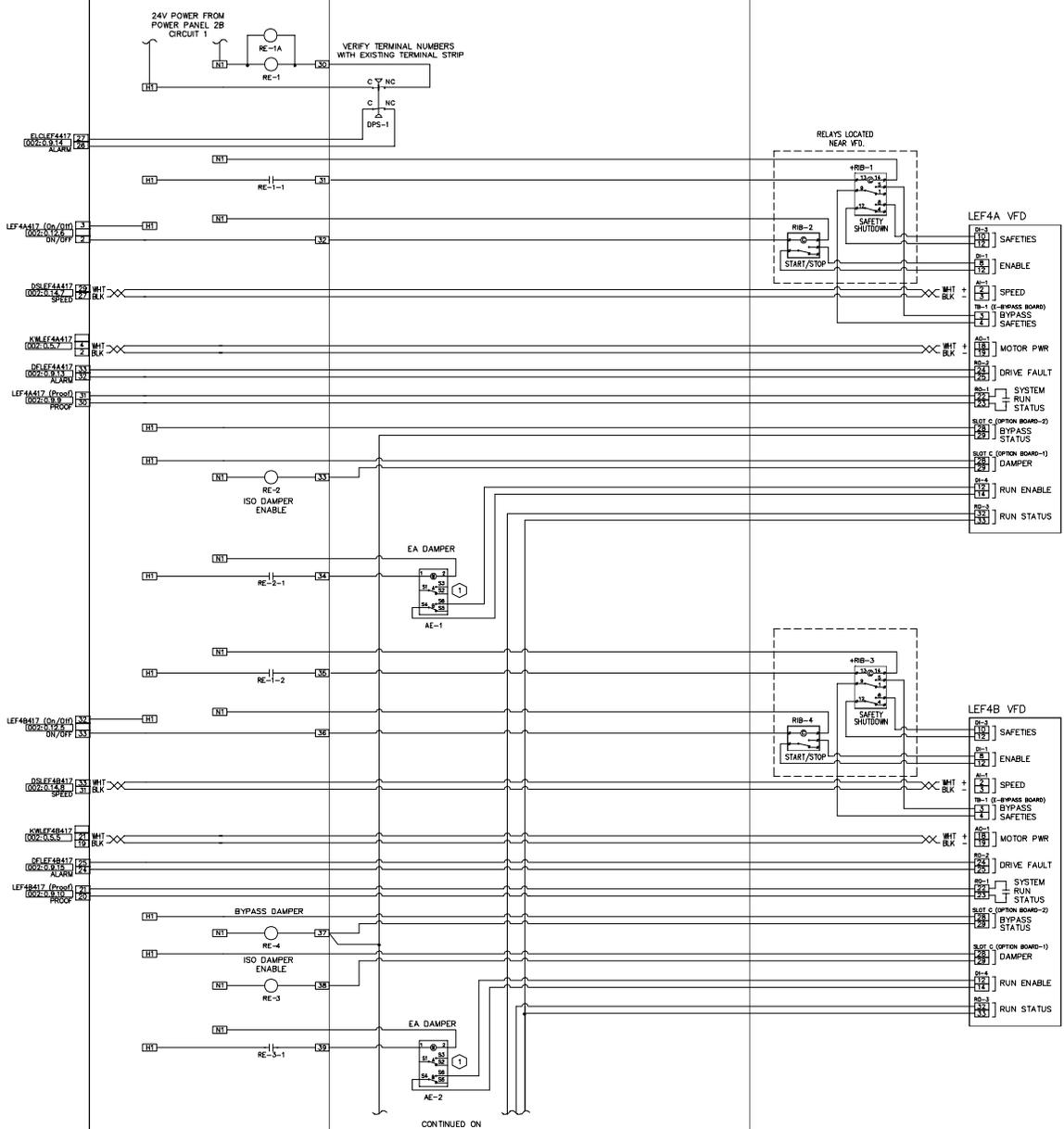
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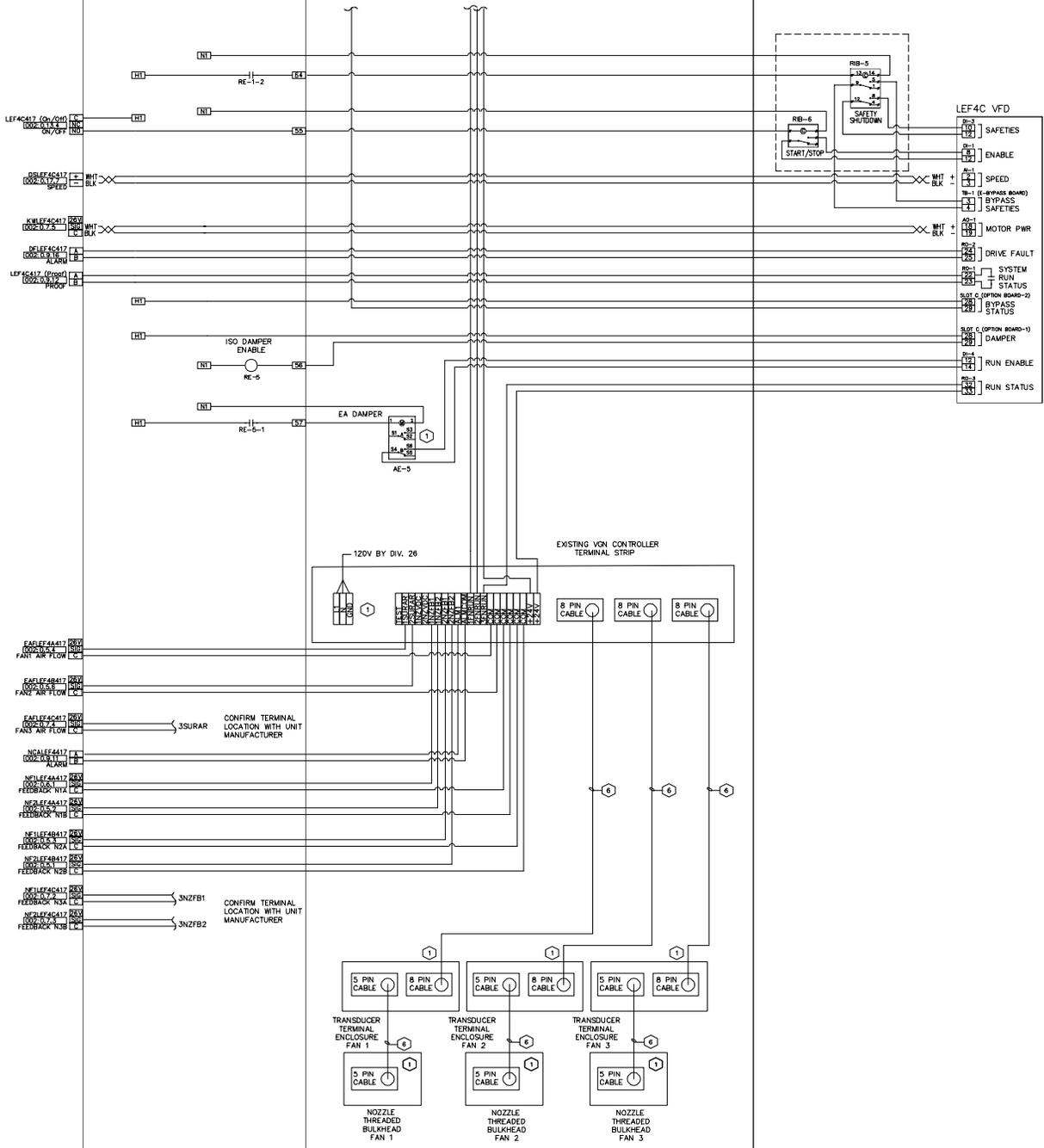
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- INSTALLATION NOTES:
1. PREPURCHASED EQUIPMENT BY ILL REFER TO GREENBOOK INSTALLATION INSTRUCTIONS FOR MOUNTING AND WIRING DETAILS.
 2. RELAYS LOCATED NEAR VFD.
 3. VERIFY VFD CABLE SPECIFICATION AND INPUT ISOLATION REQUIREMENTS V/VFD FIG.
 4. EXACT LOCATION OF FIELD DEVICES TO BE COORDINATED WITH IUES/SERVIS.
 5. ALL WIRING TO MEET REQUIREMENTS OF STANDARD WIRING SPECIFICATIONS DRAWINGS.
 6. 5 AND 8 PIN CABLES PROVIDED FURNISHED BY UNIT MANUFACTURER.



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015

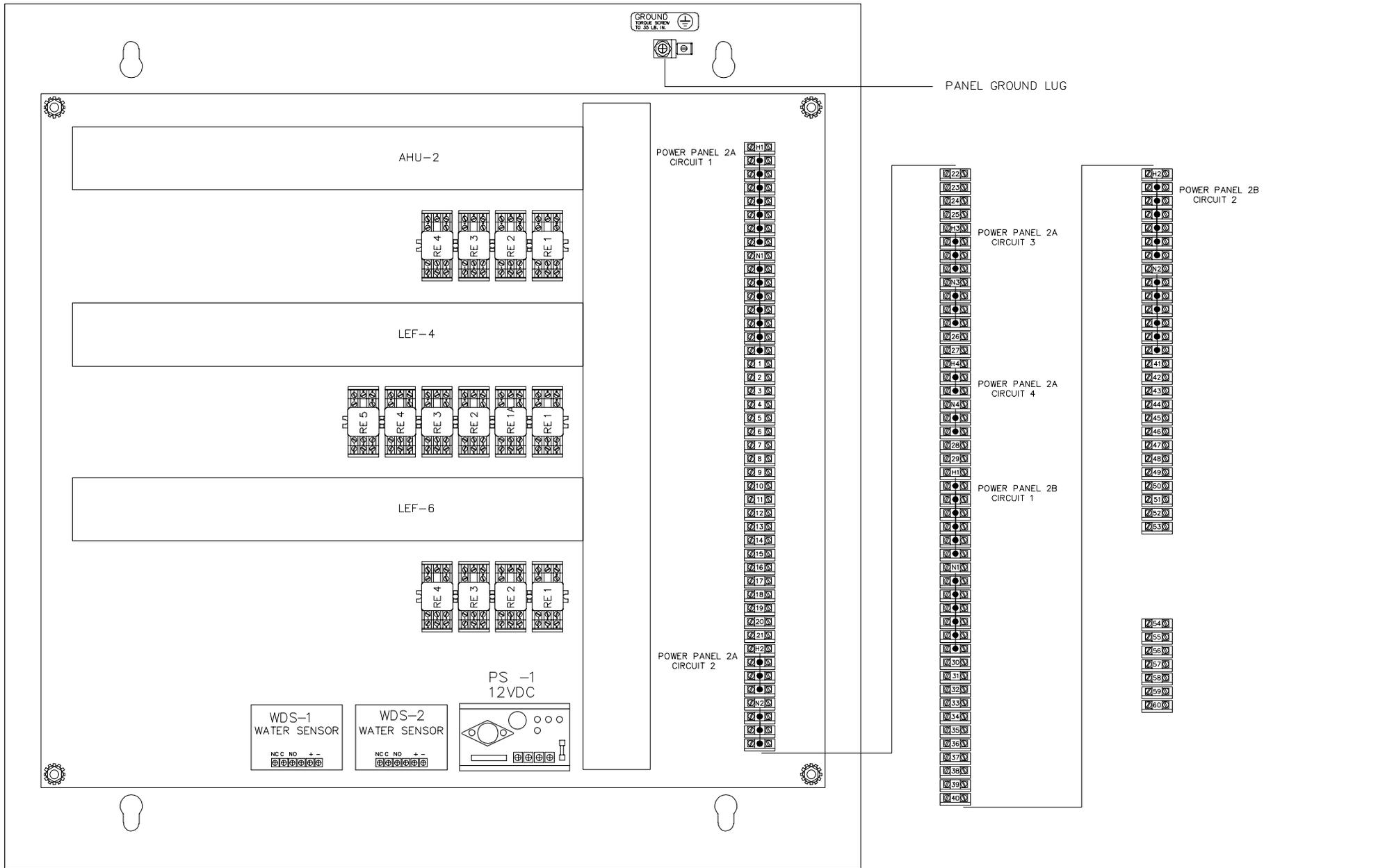
GEOLOGY - FACULTY 100
 IU PROJ #20250361,
 ENGINEER DRAFTER CHECKED BY INITIAL RELEASE LAST EDIT DATE
 WLH WLH 02/15/19 03/19/26
LEF-4 A-C CONTROL SYSTEM

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 Fax: 866-814-3089
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REVISION HISTORY

- INSTALLATION NOTES:**
- PREPURCHASED EQUIPMENT BY IUI. REFER TO GREENHECK INSTALLATION INSTRUCTIONS FOR MOUNTING AND WIRING DETAILS.
 - RELAYS LOCATED NEAR VFD.
 - VERIFY VFD CABLE SPECIFICATION AND INPUT ISOLATION REQUIREMENTS V/VFD MFG.
 - EXACT LOCATION OF FIELD DEVICES TO BE COORDINATED WITH IUES/SEIENS.
 - ALL WIRING TO MEET REQUIREMENTS OF STANDARD WIRING SPECIFICATIONS DRAWINGS.
 - 5 AND 8 PIN CABLES PROVIDED FURNISHED BY UNIT MANUFACTURER.

1 EF WIRING DIAGRAMS
 015 LOCATION: AHU-2 AUX PANEL
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1
016 AHU COMPONENT PANEL
LOCATION: REFER TO FLOOR PLAN

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LEF-4 A-C CONTROL SYSTEM

440P-415245

016

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1	1	FBUM	N/A	N/A	FURNISHED BY UNIT MFG
RIB 1	1	RIBU1C	FUNCTIONAL DEVICES	N/A	RIB 120VAC 24VAC/DC SPDT
VFD EF-9	1	FBO	N/A	N/A	FURNISHED BY OTHERS

NEW EXHAUST FAN ON ROOF LEF-9.

1. OUTDOOR-RATED UTILITY SET FAN WITH WEATHERHOOD AND COATING
2. GRAVITY BACKDRAFT DAMPER ON FAN DISCHARGE (UPBLAST)
3. VFD IS FOR BALANCING PURPOSES; UNIT TO RUN AT CONSTANT SPEED

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IU PROJ #20250361,

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WLH	WLH		02/15/19	03/19/26

EF-9 CONTROL SYSTEM

440P-415245

017

INSTALLATION NOTES:

- 1 GRAVITY BACKDRAFT DAMPER ON FAN DISCHARGE (UPBLAST).
- 2 SEE WIRING DETAILS ON ASSOCIATED ELECTRICAL DRAWING.

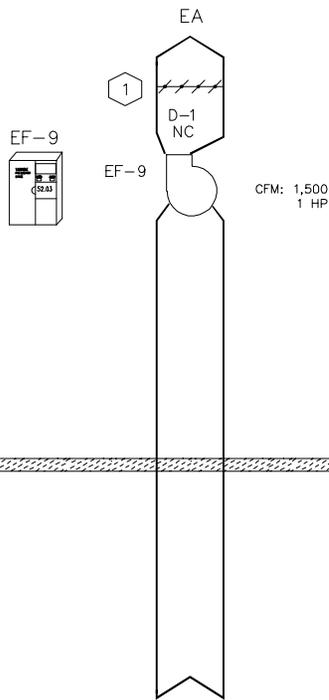
EF-9 VFD

RIB-1
LEF9417 (On/Off)
001: 0.8.1
DETAIL B

DSLEF9417
001: 0.10.6
DETAIL I
SPEED

DFLEF9417
001: 0.6.6
DETAIL E
FAULT

LEF9417 (Proof)
001: 0.6.5
DETAIL E
STATUS



1
018

EF-9
LOCATION: ROOF
SERVES: SOUTHEAST LAB 4022

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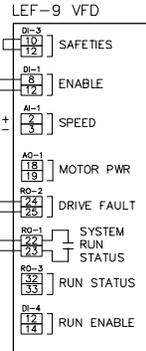
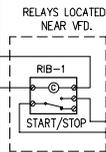
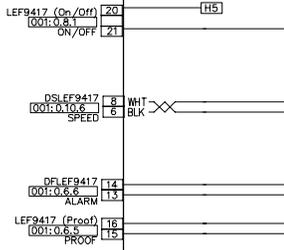
ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
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EF-9 CONTROL SYSTEM

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018

24V POWER FROM
POWER PANEL 1A
CIRCUIT 5



440P-415245
019

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IU PROJ #20250861,		WLH	WLH		02/15/19	03/19/28
EF-9 CONTROL SYSTEM						

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INSTALLATION NOTES:

- 1 120 VAC POWER BY ELECTRICAL CONTRACTOR.
- 2 EXACT LOCATION OF FIELD DEVICES TO BE COORDINATED WITH IUES/SIEMENS.
- 3 ALL WIRING TO MEET REQUIREMENTS OF STANDARD WIRING SPECIFICATIONS DRAWINGS.
- 4 WIRE VFD SPEED SIGNAL FROM EXHAUST FAN VFD TO ASSOCIATED FUME HOOD DXR.

1
019 EXHAUST WIRING DIAGRAMS
LOCATION: AUX PANEL
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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
OS 1	1	181-111+ALD	OXYGUARD	N/A	Oxygen Depletion Monitor
	1	LOCAL ALM	OXYGUARD	N/A	Local Strobe Light Alarm
	1	TRANSFORMER	OXYGUARD	N/A	115VAC/12VDC Transformer
	1	REMOTE ALM	Wheelock	N/A	Remote Combination Strobe/Alarm 120VAC

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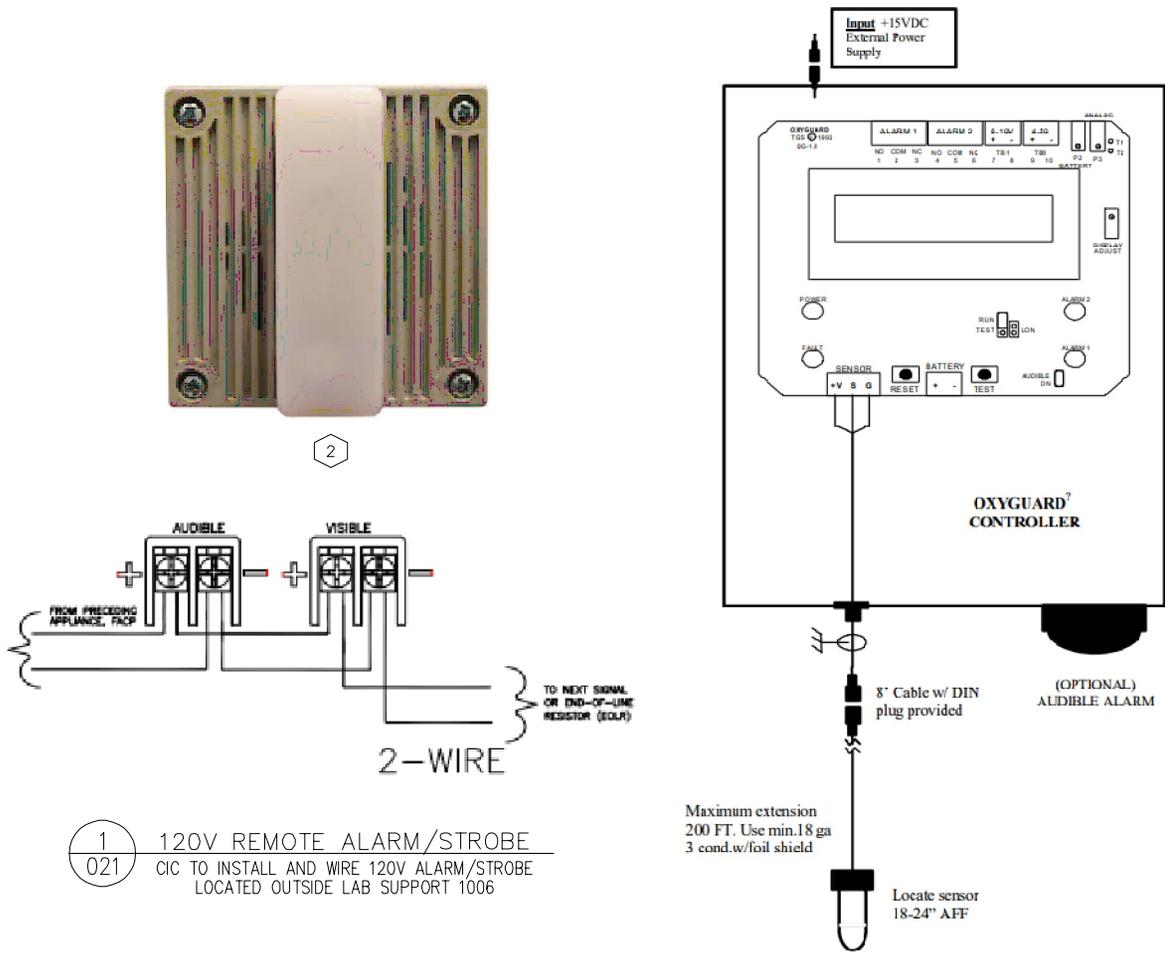
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WLH	WLH		02/15/19	03/19/26

MISC MONITORING & CONTROL

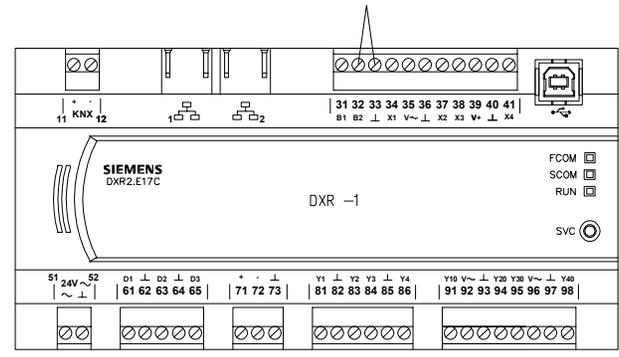
440P-415245

020

- INSTALLATION NOTES:**
- 1 POWER CORD – PROVIDED W/ WALL PLUG ADAPTER.
 - 2 AUDIBLE ALARM (OPTIONAL) FACTORY WIRE. REMOTE AUDIBLE AND VISUAL ALARMS MUST BE 120VAC AND CONNECTED TO ALARM TERMINAL STRIP.
 - 3 SENSOR CABLE BETWEEN OXYGUARD CONTROLLER AND SENSOR – MAXIMUM LENGTH 200FT. USE 3 CONDUCTOR 18 OR 20GA. W/ FOIL SHIELD.
 - 4 ANALOG OUTPUTS (OPTIONAL) ARE EITHER 0–5VDC, 0–10VDC, OR 4–20MA.



NOTE: MONITOR THE OXYGEN DEPLETION MONITOR IN LAB 1006 WITH A SPARE DI ON THE DXR SERVING THE SPACE.



1 120V REMOTE ALARM/STROBE
021 CIC TO INSTALL AND WIRE 120V ALARM/STROBE LOCATED OUTSIDE LAB SUPPORT 1006

Maximum extension
200 FT. Use min.18 ga
3 cond.w/foil shield

2 OXYGEN DEPLETION MONITOR
021 LOCATED IN LAB SUPPORT 1006

3 DXR SERVING LAB 1006
021 MONITOR THE OXYGEN DEPLETION MONITOR WITH DIGITAL INPUT 2 FROM RPC 1006

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MISC MONITORING & CONTROL				

440P-415245

021

ALT-1 WORK

Control Device	Qty	Product Number	Manufacturer	Document Number	Description	
Field Mounted Devices						
AE	1	3	PROVIDED W/ FEV			
DPTE	1	3	PROVIDED W/ FEV			
DXR	1	3	PROVIDED W/ FEV			
LGE	1	3	SEE BOX SCHEDULE			
ODP	1	3	GMX3.P87-1WSC	SIEMENS	N/A	WALL MOUNT FUME HOOD ODP (PL-LINK)
PSE	1	3	DXA.S12C	SIEMENS	N/A	SASH OPEN AREA MODULE
		TBD	546-00491	SIEMENS	149269	HORIZ UNI-TRAK TOP ASSY,70 IN
PSE	2	TBD	S55376-C158	SIEMENS	N/A	DXA.B130 SASH SENSOR

- d. Air-valve position as percent open.
- e. Control-valve position as percent open.
- f. Airflow.

LAB AIRFLOW CONTROL SEQUENCE:

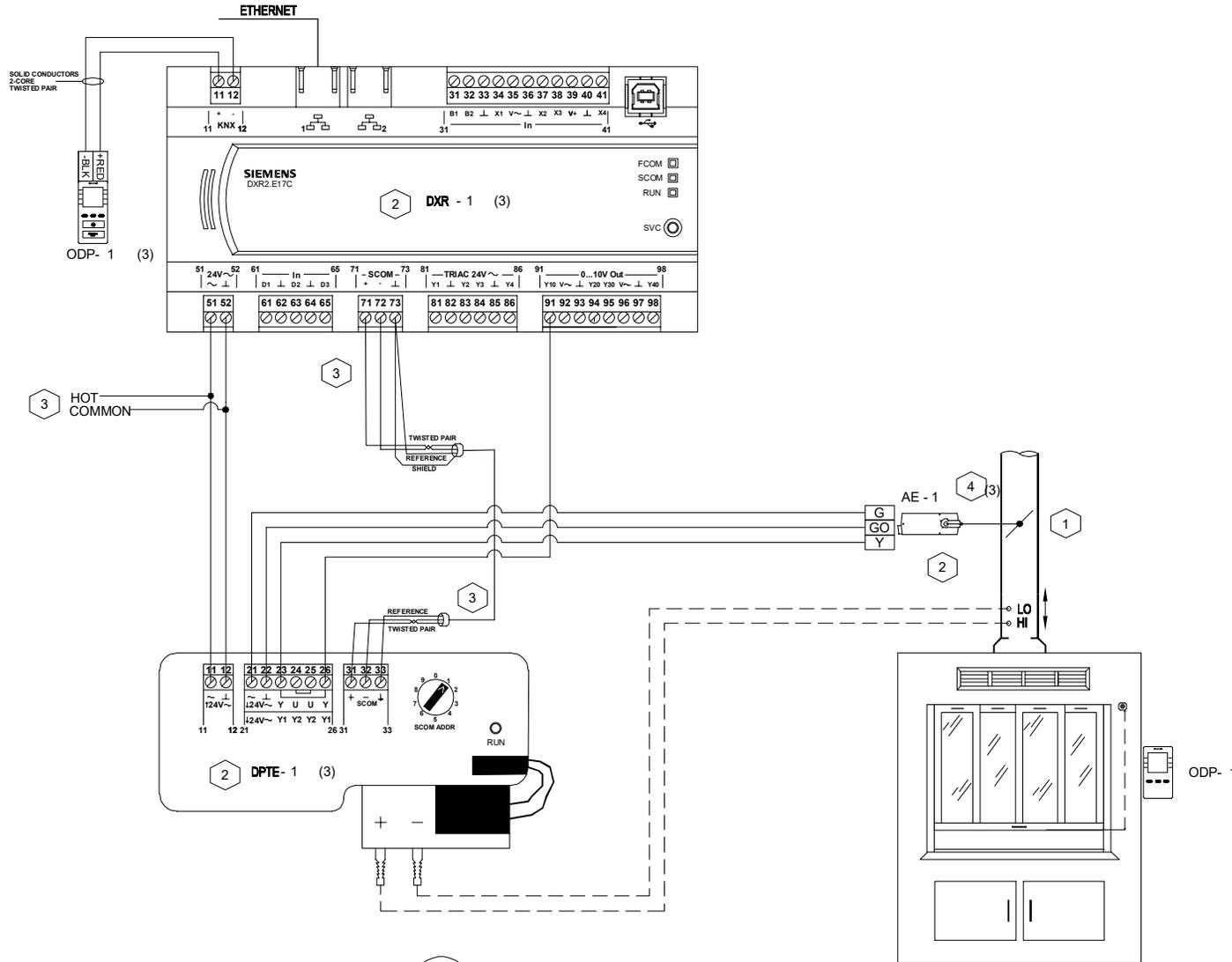
- A. General:
 - a. Control of airflow to and from each laboratory space and control of space temperature within the laboratory spaces shall be accomplished by the laboratory airflow control system (LACS). The LACS shall utilize DDC Microprocessor based logic to achieve all control functions.
 - b. Operate exhaust valve to maintain required design airflow for each fumehood with sash open and min required airflow for each fumehood with sash closed.
- B. Airflow control for labs: Some spaces may not contain all components listed below, see plans for exact configuration.
 - a. Supply Air Terminal (TU) with reheat:
 - a. Input Device: Room thermostat; DDC airflow rate to maintain necessary offset with exhaust airflow.
 - b. Output Device: Electronic air valve actuators and control-valve operators.
 - c. Action: Modulate supply air valve to maintain offset with exhaust airflow. Modulate heating control valve to maintain space temperature.
 - b. Exhaust Air Valve (EV) for hoods:
 - a. Input Device: occupant sensor at hood, hood velocity sensor.
 - b. Output Device: Electronic air valve actuators.
 - c. Action: Modulate exhaust air valve to maintain 80 fpm while lab is occupied. Alarm DDC system in low flow condition at hood.
 - c. Exhaust Air Valve (EV) for general room exhaust:
 - a. Input Device: DDC airflow rate.
 - b. Output Device: Electronic air valve actuators.
 - c. Action: Modulate exhaust air valve to maintain minimum total (hood plus general) airflow (6 ACH) 24/7. General exhaust is the difference between the total required exhaust airflow for the space and the exhaust airflow from all hoods in the room.
 - d. Display:
 - a. Room/area served.
 - b. Room temperature indication.
 - c. Room temperature set point.

REVISION HISTORY

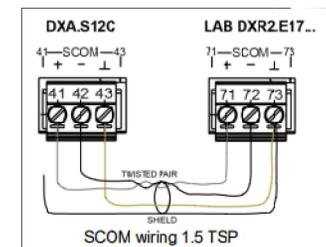
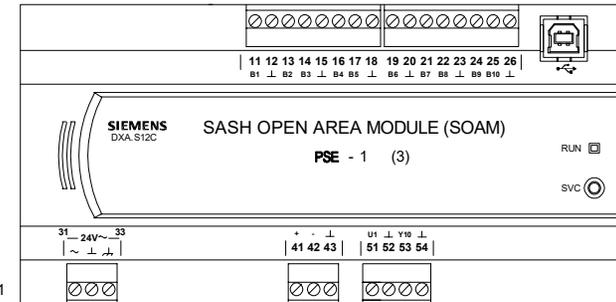
<p>SIEMENS</p> <p>Indianapolis Smart Infrastructure</p>	<p>3502 Woodview Trace Indianapolis, IN 46268 USA Phone: 317-293-8880 Fax: 866-814-3089</p>	<p>GEOLOGY - FACULTY 100 IU PROJ #20250361,</p> <table border="1" style="width: 100%; font-size: small;"> <tr> <td>ENGINEER</td> <td>DRAFTER</td> <td>CHECKED BY</td> <td>INITIAL RELEASE</td> <td>LAST EDIT DATE</td> </tr> <tr> <td>WLH</td> <td>WLH</td> <td></td> <td>02/15/19</td> <td>03/19/26</td> </tr> </table> <p>FHC - Sash Conf w Mod Vent</p>	ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE	WLH	WLH		02/15/19	03/19/26	<p>440P-415245</p> <p style="font-size: 2em; font-weight: bold;">022</p>
	ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE								
	WLH	WLH		02/15/19	03/19/26								

INSTALLATION NOTE:

- 1 DAMPER ACTUATOR MAY BE WIRED EITHER DIRECTLY FROM THE DXR OR FROM THE DXR TO THE APS (DPTE) THEN TO THE DAMPER ACTUATOR.
- 2 DEVICE FACTORY MOUNTED AND INCLUDED AS PART OF LGE CONTROL PACKAGE.
- 3 1.5 TSP COMMUNICATION CABLE TO EACH ASSOCIATED LAB DEVICE.
- 4 SEE BOX SCHEDULE FOR ACTUATOR AND VALVE MODEL. VALVE, ACTUATOR AND CONTROLLER PACKAGE.
- 5 CONFIRM PRESENCE DETECTOR WIRING REQUIREMENTS WITH UNIT MANUFACTURER.



SASH MANAGEMENT FOR ADVANCED FUME HOODS WITH 2-10 SASHES.



023 FHC - MODULATING FAST ACT
TYPICAL OF (3) COMBINATION SASH FUME HOODS
FEV-1.1, FEV-1.2, & FEV-1.3

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IU PROJ #20250361,

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WLH	WLH		02/15/19	03/19/26

FHC - Sash Conf w Mod Vent

440P-415245

023

ALT-1 WORK

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1-2	2	GNP191.1P	SIEMENS	154083	FAIL SAFE, 50 LB-IN, 2 SEC. RUN
DPTE 1-2	2	DXA.S04P1	SIEMENS	N/A	AIR FLOW PRES SENSOR 1"
DXR 1	1	DXR2.E17C-103B	SIEMENS	N/A	DXR2.E17C-103B AUTOMATION STATION
TTE 1	1	QMX3.P30	SIEMENS	A6V10394781	QMX3 ROOM TEMP ONLY
TTE 2	1	QAM2030.010	SIEMENS	149915	DUCT POINT TEMP, 10K OHM TYPE 2, 4"
V					SEE VALVE SUBMITTAL

LAB AIRFLOW CONTROL SEQUENCE:

- A. General:
 - a. Control of airflow to and from each laboratory space and control of space temperature within the laboratory spaces shall be accomplished by the laboratory airflow control system (LACS). The LACS shall utilize DDC Microprocessor based logic to achieve all control functions.
 - b. Operate exhaust valve to maintain required design airflow for each fumehood with sash open and min required airflow for each fumehood with sash closed.
- B. Airflow control for labs: Some spaces may not contain all components listed below, see plans for exact configuration.
 - a. Supply Air Terminal (TU) with reheat:
 - a. Input Device: Room thermostat; DDC airflow rate to maintain necessary offset with exhaust airflow.
 - b. Output Device: Electronic air valve actuators and control-valve operators.
 - c. Action: Modulate supply air valve to maintain offset with exhaust airflow. Modulate heating control valve to maintain space temperature.
 - b. Exhaust Air Valve (EV) for hoods:
 - a. Input Device: occupant sensor at hood, hood velocity sensor.
 - b. Output Device: Electronic air valve actuators.
 - c. Action: Modulate exhaust air valve to maintain 80 fpm while lab is occupied. Alarm DDC system in low flow condition at hood.
 - c. Exhaust Air Valve (EV) for general room exhaust:
 - a. Input Device: DDC airflow rate.
 - b. Output Device: Electronic air valve actuators.
 - c. Action: Modulate exhaust air valve to maintain minimum total (hood plus general) airflow (6 ACH) 24/7. General exhaust is the difference between the total required exhaust airflow for the space and the exhaust airflow from all hoods in the room.
 - d. Display:
 - a. Room/area served.
 - b. Room temperature indication.
 - c. Room temperature set point.
 - d. Air-valve position as percent open.
 - e. Control-valve position as percent open.
 - f. Airflow.
 - g. Room occupancy status.

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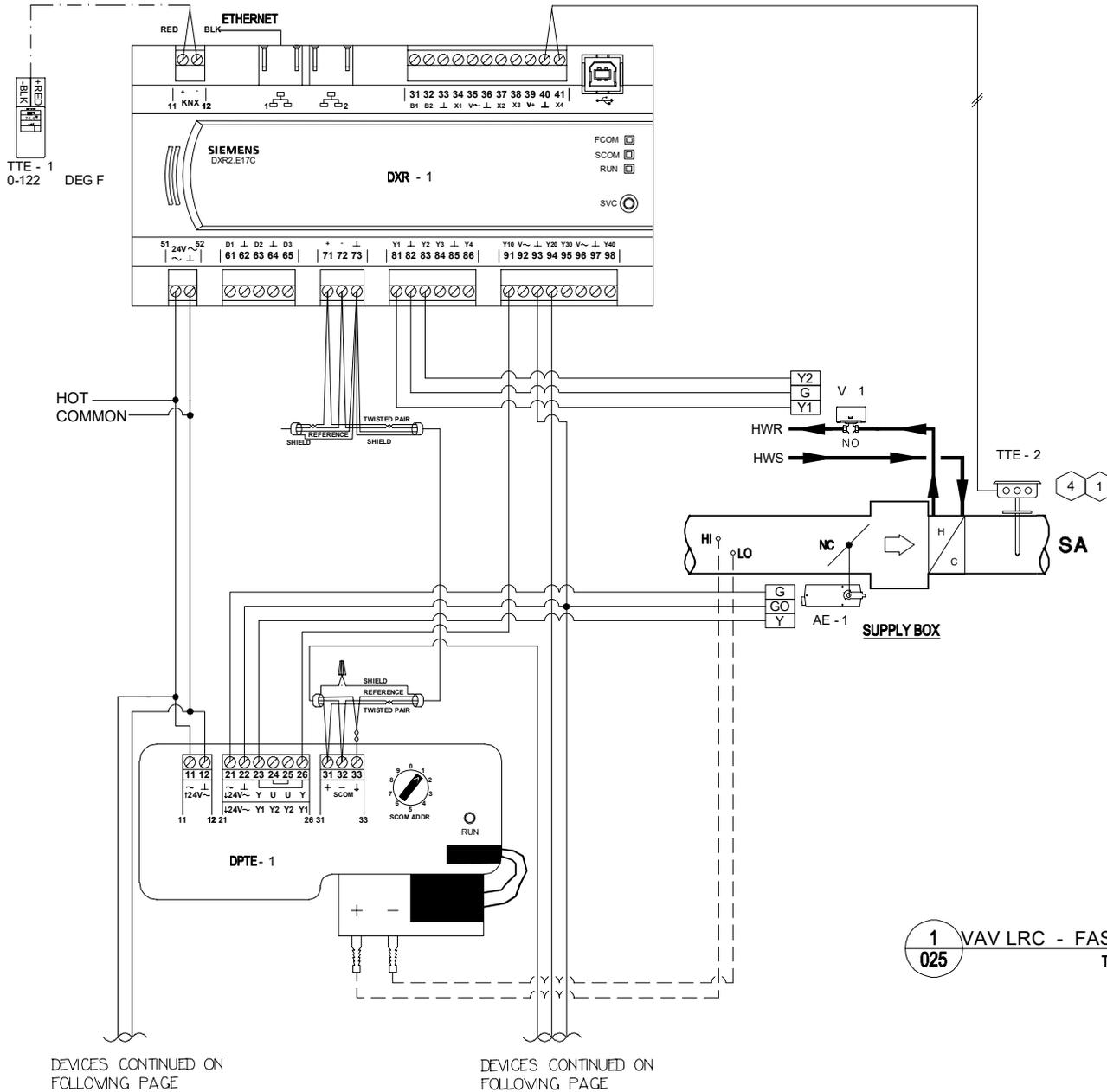
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WLH	WLH		02/15/19	03/19/26

LRC - Fast Act w HW Rht w EV

440P-415245

024



INSTALLATION NOTES:

- 1 PLACE SENSOR MIN 5 FT DOWNSTREAM OF COIL FACE.
- 2 DXR2-1 TO BE MOUNTED IN MANUFACTURER SUPPLIED CONTROLLER ENCLOSURE
- 3 REFER TO BUILDING POWER TRUNK DRAWING FOR 24 VAC POWER
- 4 4" SENSOR SELECTED AS DEFAULT. SIZE AS APPROPRIATE.
- 5 LOCATE AS SHOWN ON FLOOR PLANS/CONTRACT DOCUMENTS
- 6 1.5 TSP COMMUNICATION CABLE TO EACH ASSOCIATED LAB DEVICE.

DATA POINTS (30 MAX)	
PHYSICAL	4
KNX	3
TOTAL	7

KNX LOADS (50mA MAX)	
TTE-1	10mA
TOTAL	10mA

24 VAC LOADS	
DXR-1	8VA
OCCB-1	X
V-1	X
TOTAL	8VA

DEVICES CONTINUED ON FOLLOWING PAGE

DEVICES CONTINUED ON FOLLOWING PAGE

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LRC - Fast Act w HW Rht w EV

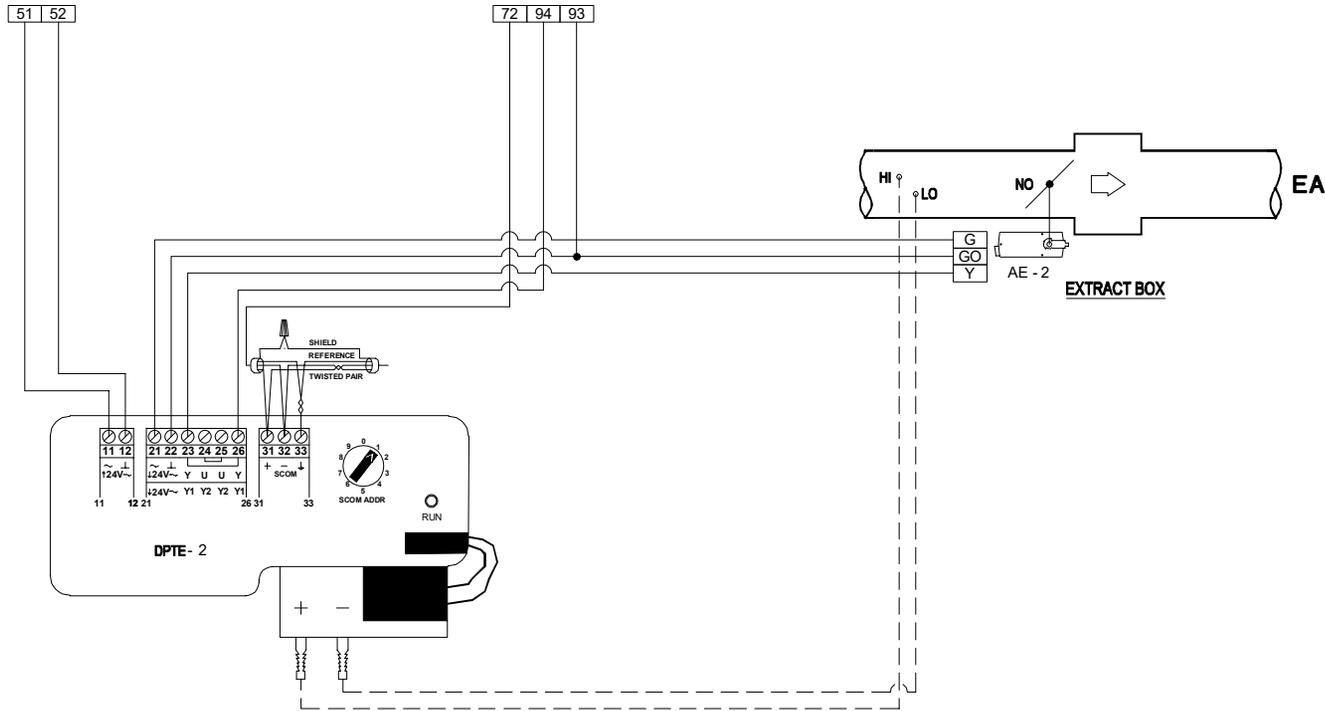
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025

DEVICES CONTINUED FROM
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TO TERMINALS ON
DXR CONTROLLER

TO TERMINALS ON
DXR CONTROLLER



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WLH	WLH		02/15/19	03/17/26

LRC - Fast Act Damper w HW Rht

440P-415245

026

TYPICAL OF 9 UNITS:
 (2) EXISTING UNITS TO BE REUSED
 (2) NEW UNITS (BASE BID)
 (5) RELOCATED UNITS (BASE BID)

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1-2	18	GEB161.1P	SIEMENS	155 318	MOD NSR,24V,132LBIN,PLM
DPTE 1-2	18	DXA.S04P1	SIEMENS	N/A	AIR FLOW PRES SENSOR 1"
DXR 1	9	DXR2.E17C-103B	SIEMENS	N/A	DXR2.E17C-103B AUTOMATION STATION
TTE 1	2	QMX3.P30-1WSB	SIEMENS	N/A	QMX3 ROOM TEMP ONLY (COO=USA)
TTE 2	2	QAM2030.010	SIEMENS	149915	DUCT POINT TEMP, 10K OHM TYPE 2, 4"
V					SEE VALVE SUBMITTAL
V* 1	7	SSC61U	SIEMENS	155 313	ELEC-MECHANC VALVE ACTUATOR 24

TU-1.43 (TU-1.33) WILL BE A RELOCATED UNITS IF ALT-1 IS TAKEN

LAB AIRFLOW CONTROL SEQUENCE:

General:

Control of airflow to and from each laboratory space and control of space temperature within the laboratory spaces shall be accomplished by the laboratory airflow control system (LACS). The LACS shall utilize DDC Microprocessor based logic to achieve all control functions.

Operate exhaust valve to maintain required design airflow for each fumehood with sash open and min required airflow for each fumehood with sash closed.

Airflow control for labs: Some spaces may not contain all components listed below, see plans for exact configuration.

Supply Air Terminal (TU) with reheat:

Input Device: Room thermostat; DDC airflow rate to maintain necessary offset with exhaust airflow.

Output Device: Electronic air valve actuators and control-valve operators.

Action: Modulate supply air valve to maintain offset with exhaust airflow. Modulate heating control valve to maintain space temperature.

Exhaust Air Valve (EV) for hoods:

Input Device: occupant sensor at hood, hood velocity sensor.

Output Device: Electronic air valve actuators.

Action: Modulate exhaust air valve to maintain 80 fpm while lab is occupied. Alarm DDC system in low flow condition at hood.

Exhaust Air Valve (EV) for general room exhaust:

Input Device: DDC airflow rate.

Output Device: Electronic air valve actuators.

Action: Modulate exhaust air valve to maintain minimum total (hood plus general) airflow (6 ACH) 24/7.

General exhaust is the difference between the total required exhaust airflow for the space and the exhaust airflow from all hoods in the room.

Display:

Room/area served.

Room temperature indication.

Room temperature set point.

Air-valve position as percent open.

Control-valve position as percent open.

Airflow.

Room occupancy status.

REVISION HISTORY

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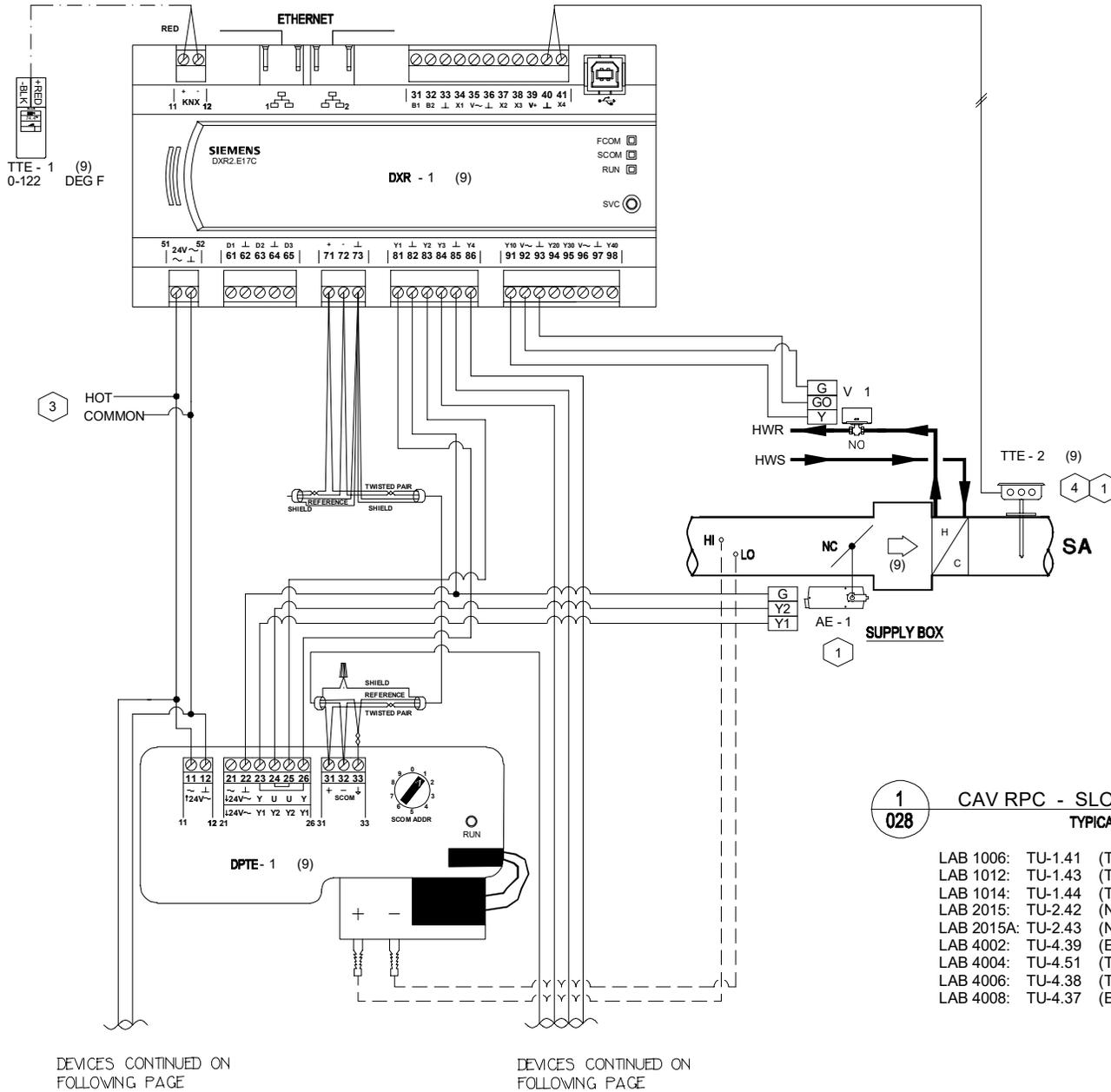
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WLH	WLH		02/15/19	03/22/26

RPC - Slow Act w HW Rht w EV

440P-415245

027



INSTALLATION NOTES:

- 1 PLACE SENSOR MIN 5 FT DOWNSTREAM OF COIL FACE.
- 2 DXR2-1 TO BE MOUNTED IN MANUFACTURER SUPPLIED CONTROLLER ENCLOSURE
- 3 REFER TO BUILDING POWER TRUNK DRAWING FOR 24 VAC POWER
- 4 4" SENSOR SELECTED AS DEFAULT. SIZE AS APPROPRIATE.
- 5 LOCATE AS SHOWN ON FLOOR PLANS/CONTRACT DOCUMENTS
- 6 1.5 TSP COMMUNICATION CABLE TO EACH ASSOCIATED LAB DEVICE.

NOTE: MONITOR THE OXYGEN DEPLETION MONITOR IN LAB 1006 WITH A SPARE DI ON THE DXR SERVING THE SPACE.

1
028 CAV RPC - SLOW ACT DAMPER SUP/EXH
TYPICAL OF 9

LAB 1006:	TU-1.41 (TU-2.31)	EV-1.5 (NEW)
LAB 1012:	TU-1.43 (TU-3.26)	EV-1.7 (NEW)
LAB 1014:	TU-1.44 (TU-3.28)	EV-1.8 (NEW)
LAB 2015:	TU-2.42 (NEW)	EV-2.9 (NEW)
LAB 2015A:	TU-2.43 (NEW OR TU-1.33)	EV-2.7 (NEW)
LAB 4002:	TU-4.39 (EXISTING)	EV-4.10 (NEW)
LAB 4004:	TU-4.51 (TU-3.25)	EV-4.11 (NEW)
LAB 4006:	TU-4.38 (TU-1..26)	EV-4.12 (NEW)
LAB 4008:	TU-4.37 (EXISTING)	EV-4.13 (NEW)

DATA POINTS (30 MAX)	
PHYSICAL	6
KNX	3
TOTAL	9

KNX LOADS (50mA MAX)	
TTE-1	10mA
TOTAL	10mA

24 VAC LOADS	
DXR-1	8VA
AE-1	X
AE-2	X
TOTAL	22VA

DEVICES CONTINUED ON FOLLOWING PAGE

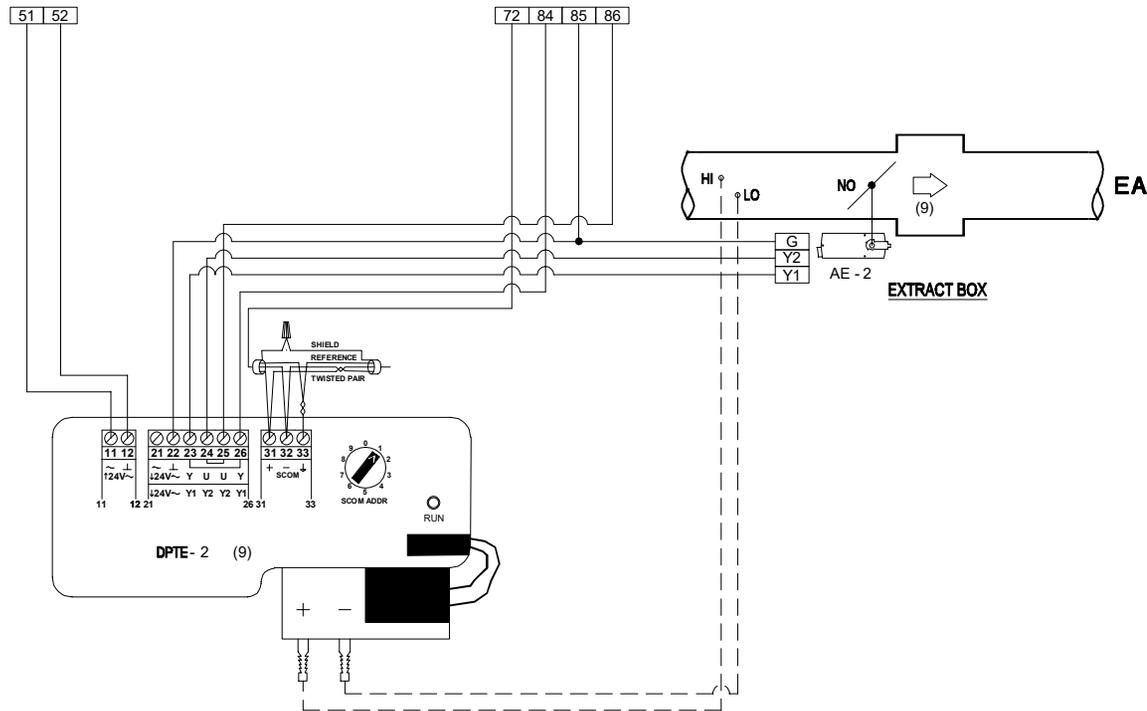
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<p>REVISION HISTORY</p>	<p>SIEMENS</p> <p>Indianapolis Smart Infrastructure</p>	<p>GEOLOGY - FACULTY 100 IU PROJ #20250361,</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>ENGINEER</td> <td>DRAFTER</td> <td>CHECKED BY</td> <td>INITIAL RELEASE</td> <td>LAST EDIT DATE</td> </tr> <tr> <td>WLH</td> <td>WLH</td> <td></td> <td>02/15/19</td> <td>03/23/26</td> </tr> </table> <p>RPC - Slow Act w HW Rht w EV</p>	ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE	WLH	WLH		02/15/19	03/23/26
ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE								
WLH	WLH		02/15/19	03/23/26								
		<p>440P-415245</p> <p style="font-size: 2em; font-weight: bold;">028</p>										

DEVICES CONTINUED FROM
PREVIOUS PAGE

TO TERMINALS ON
DXR CONTROLLER

TO TERMINALS ON
DXR CONTROLLER



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WLH	WLH		02/15/19	03/19/26

RPC - Slow Act w HW Rht w EV

440P-415245

029

TYPICAL OF 16 UNITS:
 (6) EXISTING UNITS TO BE REUSED
 (5) NEW UNITS (BASE BID)
 (5) RELOCATED UNITS (BASE BID)

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1	5	GDE131.1P	SIEMENS	154 011	ACT NSR PLENUM 24/108L 5Nm
DXR 1	5	DXR2.M12P-102B	SIEMENS	A6V10502838	DXR2.M12P Room Automation Station
TTE 1	5	QMX3.P30	SIEMENS	A6V10394781	QMX3 ROOM TEMP ONLY
TTE 2	5	QAM2030.010	SIEMENS	149915	DUCT POINT TEMP, 10K OHM TYPE 2, 4"
V					SEE VALVE SUBMITTAL

TU-1.38(TU-1.34) AND TU-5.24(TU-1.32) WILL BE RELOCATED UNITS IF ALT-1 IS TAKEN

VAV, Terminal Air Units with Hydronic Coils:

- a. Room Temperature:
 - a. Input Device: Room thermostat.
 - b. Output Device: Electronic damper actuators and control-valve operators.
 - c. Action: Modulate damper to maintain constant airflow and valve to maintain temperature.
 - 1) Sequence valve from min open position to fully open.
- b. Display:
 - a. Room/area served.
 - b. Room temperature indication.
 - c. Room temperature set point.
 - d. Air-damper position as percent open.
 - e. Control-valve position as percent open.
 - f. Airflow.

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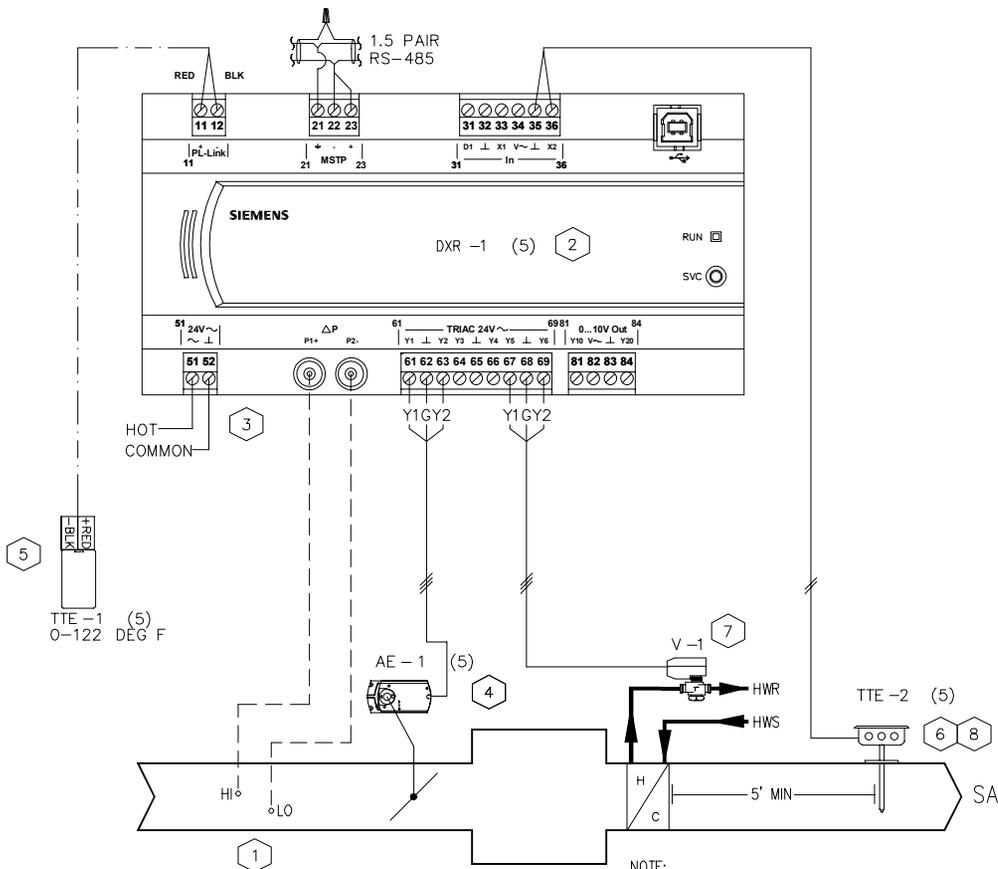
IU PROJ #20250361,

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
WLH	WLH		02/15/19	03/22/26

VAV Supply Box w/HW (15109)

440P-415245

030



NOTE:
ALL CONTACTORS AND
SAFETY DEVICES BY OTHERS

INSTALLATION NOTES:

- 1 VAV BOX INSTALLED BY MECHANICAL CONTRACTOR WITH 3 TO 5 STRAIGHT DUCT DIAMETERS UPSTREAM OF BOX TO PROVIDE PROPER FLOW SENSING
- 2 DXR2-1 TO BE MOUNTED IN MANUFACTURER SUPPLIED CONTROLLER ENCLOSURE
- 3 REFER TO BUILDING POWER TRUNK DRAWING FOR 24 VAC POWER
- 4 MOUNT ACTUATOR WITH DAMPER IN FULL OPEN POSITION. VERIFY DXR-1 AND ACTUATOR REQUIREMENT WITH THE BOX MANUFACTURER
- 5 LOCATE AS SHOWN ON FLOOR PLANS/CONTRACT DOCUMENTS
- 6 4" SENSOR SELECTED AS DEFAULT. SIZE AS APPROPRIATE.
- 7 3-WAY VALVE PIPING DETAIL
- 8 PLACE SENSOR MIN 5 FT DOWNSTREAM OF COIL FACE.

DEVICE	SIEMENS		MANUFACTURER	DIVISION 26	DIVISION 23
	FITTER	ELEC.			
TTE-1/2		M,W			
AE-1		M,W			
DXR2-1		M,W,P			
COMMS		W			
POWER (24VAC)		W			

M-MOUNTED
W-WIRED
P-PIPED

031 VAV w/HW RHT (15109)
TYPICAL OF (16)
(5) RELOCATED VAV'S (BASE BID)
(5) NEW VAV'S (BASE BID)
(6) EXISTING VAV'S

1004	TU-1.38 (NEW OR TU-1.34)	4022B	TU-4.33 (EXISTING)
1005	TU-1.39 (TU-6.0) ALT-1	4022C	TU-4.50 (TU-3.29)
1005	TU-1.40 (NEW) ALT-1	4022D	TU-4.31 (EXISTING)
2015B	TU-2.30 (EXISTING)	4022E	TU-4.30 (EXISTING)
3021	TU-3.48 (NEW)	5024	TU-5.21 (EXISTING)
4010	TU-4.52 (TU-3.27)	5024A	TU-5.24 (NEW OR TU-1.32)
4022	TU-4.32 (EXISTING)	5024B	TU-5.25 (TU-1.29)
4022A	TU-4.49 (TU-1.28)	6020	TU-6.0 (NEW)

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WLH	WLH	BH	02/15/19	03/22/26

VAV Supply Box w/HW (15109)

440P-415245

031

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1	2	GDE131.1P	SIEMENS	154 011	ACT NSR PLENUM 24/108L 5Nm
DXR 1	2	DXR2.M12P-102B	SIEMENS	A6V10502838	DXR2.M12P Room Automation Station

LAB AIRFLOW CONTROL SEQUENCE:

General:

Control of airflow to and from each laboratory space and control of space temperature within the laboratory spaces shall be accomplished by the laboratory airflow control system (LACS). The LACS shall utilize DDC Microprocessor based logic to achieve all control functions.

Operate exhaust valve to maintain required design airflow for each fumehood with sash open and min required airflow for each fumehood with sash closed.

Airflow control for labs: Some spaces may not contain all components listed below, see plans for exact configuration.

Supply Air Terminal (TU) with reheat:

Input Device: Room thermostat; DDC airflow rate to maintain necessary offset with exhaust airflow.

Output Device: Electronic air valve actuators and control-valve operators.

Action: Modulate supply air valve to maintain offset with exhaust airflow. Modulate heating control valve to maintain space temperature.

Exhaust Air Valve (EV) for hoods:

Input Device: occupant sensor at hood, hood velocity sensor.

Output Device: Electronic air valve actuators.

Action: Modulate exhaust air valve to maintain 80 fpm while lab is occupied. Alarm DDC system in low flow condition at hood.

Exhaust Air Valve (EV) for general room exhaust:

Input Device: DDC airflow rate.

Output Device: Electronic air valve actuators.

Action: Modulate exhaust air valve to maintain minimum total (hood plus general) airflow (6 ACH) 24/7.

General exhaust is the difference between the total required exhaust airflow for the space and the exhaust airflow from all hoods in the room.

Display:

Room/area served.

Room temperature indication.

Room temperature set point.

Air-valve position as percent open.

Control-valve position as percent open.

Airflow.

Room occupancy status.

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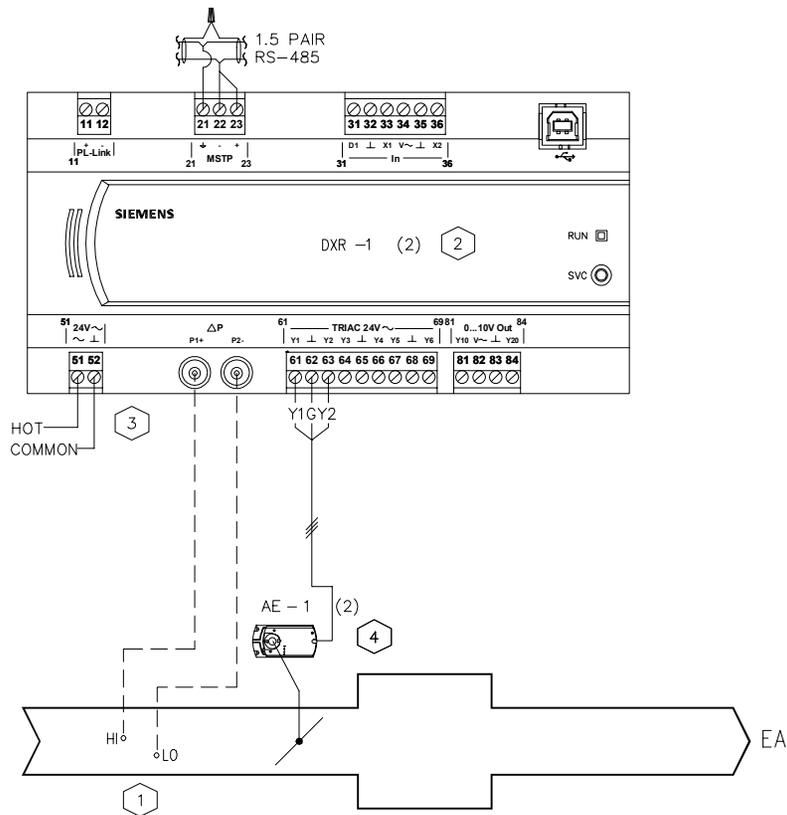
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WLH	WLH		02/15/19	03/19/26

CAV Exhaust Valve (15805)

440P-415245

032



INSTALLATION NOTES:

- 1 VAV BOX INSTALLED BY MECHANICAL CONTRACTOR WITH 3 TO 5 STRAIGHT DUCT DIAMETERS UPSTREAM OF BOX TO PROVIDE PROPER FLOW SENSING
- 2 DXR2-1 TO BE MOUNTED IN MANUFACTURER SUPPLIED CONTROLLER ENCLOSURE
- 3 REFER TO BUILDING POWER TRUNK DRAWING FOR 24 VAC POWER
- 4 MOUNT ACTUATOR WITH DAMPER IN FULL OPEN POSITION. VERIFY DXR-1 AND ACTUATOR REQUIREMENT WITH THE BOX MANUFACTURER
- 5 LOCATE AS SHOWN ON FLOOR PLANS/CONTRACT DOCUMENTS
- 6 4" SENSOR SELECTED AS DEFAULT. SIZE AS APPROPRIATE.
- 7 PLACE SENSOR MIN 5 FT DOWNSTREAM OF COIL FACE.

DEVICE	SIEMENS		MANUFACTURER	DIVISION 26	DIVISION 23
	FITTER	ELEC.			
TTE-1/2		M,W			
AE-1			M,W		
DXR2-1			M,W,P		
COMMS		W			
POWER (24VAC)		W			

M-MOUNTED
W-WIRED
P-PIPED

1
033 CAV EXHAUST VALVE (15020)
TYPICAL OF (2)
EV-1.4 1005 (ALT-1)
EV-2.8 2015B

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WLH	WLH		02/15/19	03/19/26

CAV Exhaust Valve (15805)

440P-415245

033

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
DXR	1	DXR2.M18-101B	SIEMENS	A6V10502840	DXR2.M18 Room Automation Station
RE	1	RIBU1C	FUNCTIONAL DEVICES	N/A	RIB 120VAC 24VAC/DC SPDT
TTE	1	QMX3.P30	SIEMENS	A6V10394781	QMX3 ROOM TEMP ONLY
TTE	2	QAM2032.010	SIEMENS	149915	DUCT POINT TEMP, 10K OHM TYPE 3, 4"
V					SEE VALVE SUBMITTAL
XFMR	1	TR100VA002	KELE INC	TR100VA002	Xfrmr 100VA,120-24V,dual hub,ClassII UL

CABINET UNIT HEATER SEQUENCE OF OPERATION:

THE UNIT SHALL BE CONTROLLED BY A DEDICATED DIGITAL CONTROLLER. THE CONTROLLER SHALL BE CONNECTED TO THE BMS CONTROL NETWORK.

EACH CONTROLLER SHALL HAVE A USER DEFINED OCCUPIED/UNOCCUPIED MODE SCHEDULE. OCCUPIED AND UNOCCUPIED MODES SHALL HAVE INDIVIDUAL HEATING ZONE TEMPERATURE SETPOINTS.

DURING OCCUPIED MODE, THE CONTROLLER SHALL START THE FAN AND OPEN THE HOT WATER CONTROL VALVE TO MAINTAIN ZONE TEMPERATURE SETPOINT.

UNOCCUPIED MODE IS SAME AS OCCUPIED WITH UNOCCUPIED ZONE TEMPERATURE SETPOINTS.

REVISION HISTORY

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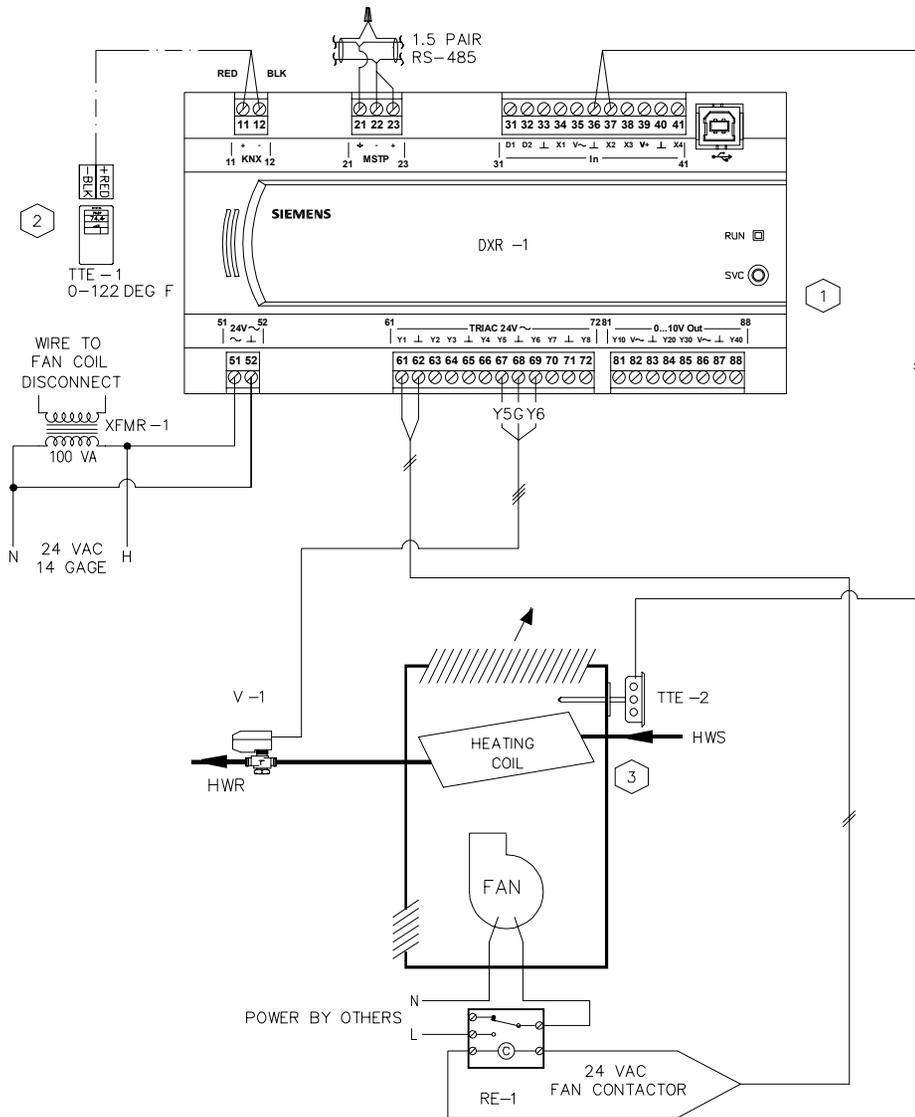
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IU PROJ #20250361,

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WLH	WLH		02/15/19	03/22/26

15050 - 2 Pipe CUH Htg

440P-415245

034



INSTALLATION NOTES:

- 1 DXR2-1 TO BE MOUNTED IN MANUFACTURER SUPPLIED CONTROLLER ENCLOSURE
- 2 LOCATE AS SHOWN ON FLOOR PLANS/CONTRACT DOCUMENTS
- 3 UNIT WILL BE HEATING OR COOLING ONLY. EXAMPLE: UNIT HEATERS WILL RECEIVE ONLY HOT WATER, COOLING ONLY FCU WILL RECEIVE ONLY CHILLED WATER.

DEVICE	SIEMENS		MANUFACTURER	DIVISION 16	DIVISION 15
	FITTER	ELEC.			
TTE-1		M,W			
TTE-2		M,W			
DXR-1		M,W			
V-1/2		W			M
RE-1		M,W			
MSTP TRUNK		W			
POWER (24VAC)		W			
XFMR-1		M,W			

M-MOUNTED
W-WIRED

035 CUH 2-PIPE HW (14050)
LOCATION: ENTRY 1999D

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ADD EF-9 POINTS TO EXISTING PXCM-1 TXIO MODULES AS SHOWN.

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PXCM-1 AHU-1

440P-415245

036

PXCM -00000 PXC100-E96.A

PXC MODULAR

Module: 1 / Rail: 1

TXIO-0000X TXS1.12F4

POWER SUPPLY 24 Volt 4A

Module: 2 / Rail: 1

TXIO-00001 TXM1.8X

2	┌	MT11417				PT21417			19	┌
3	V= (1)	0.11	LAI	VALUE	RTD	0.15	LAI	VALUE	20	┌
4	↔	AHU-1 MIX TEMP 1				AHU-1 PREHT TMP2			21	┌
6	┌	MT21417				HWRT1417			23	┌
7	V= (2)	0.12	LAI	VALUE	RTD	0.16	LAI	VALUE	24	┌
8	↔	AHU-1 MIX TEMP 2				AHU-1 HWR TMP			25	┌
10	┌	RMH1A417				RMH1B417			27	┌
11	V= (3)	0.13	LAI	VALUE	VOLTAGE	0.17	LAI	VALUE	28	┌
12	↔	HUM 1 SPACE HUM				HUM 3 SPACE HUM			29	┌
14	┌	ST1417				RT1417			31	┌
15	V= (4)	0.14	LAI	VALUE	RTD	0.18	LAI	VALUE	32	┌
16	↔	AHU-1 SUP TEMP				AHU-1 RETURN TEM			33	┌

Module: 3 / Rail: 1

TXIO-00002 TXM1.8X

2	┌								19	┌
3	V= (1)	0.21	X			0.25	X		20	┌
4	↔								21	┌
6	┌	DP11417							23	┌
7	V= (2)	0.22	LAI	VALUE	CURRENT	0.26	X		24	┌
8	↔	AHU-1 2/3 DUCT P							25	┌
10	┌	SHP1417							27	┌
11	V= (3)	0.23	LAI	VALUE	CURRENT	0.27	X		28	┌
12	↔	AHU-1 SUP HI PRS							29	┌
14	┌	RHP1417				BSP11417			31	┌
15	V= (4)	0.24	LAI	VALUE	CURRENT	0.28	LAI	VALUE	32	┌
16	↔	AHU1 RF DISCH SP				AHU1 BLDG SP1			33	┌

Module: 4 / Rail: 1

TXIO-00003 TXM1.8X

2	┌	SH1A417				SAF1B417			19	┌
3	V= (1)	0.31	LAI	VALUE	CURRENT	0.35	LAI	VALUE	20	┌
4	↔	HUM 1 DISCH RH				AHU1 SFB FLOW			21	┌
6	┌	SH1B417							23	┌
7	V= (2)	0.32	LAI	VALUE	CURRENT	0.36	X		24	┌
8	↔	HUM 3 DISCH RH							25	┌
10	┌	RAF1A417				SAF1A417			27	┌
11	V= (3)	0.33	LAI	VALUE	VOLTAGE	0.37	LAI	VALUE	28	┌
12	↔	AH1 RFA FLO				AHU1 SFA FLOW			29	┌
14	┌	RAF1B417							31	┌
15	V= (4)	0.34	LAI	VALUE	VOLTAGE	0.38	X		32	┌
16	↔	AHU1 RFB FLO							33	┌

Module: 5 / Rail: 1

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037

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ENGINEER: WLH
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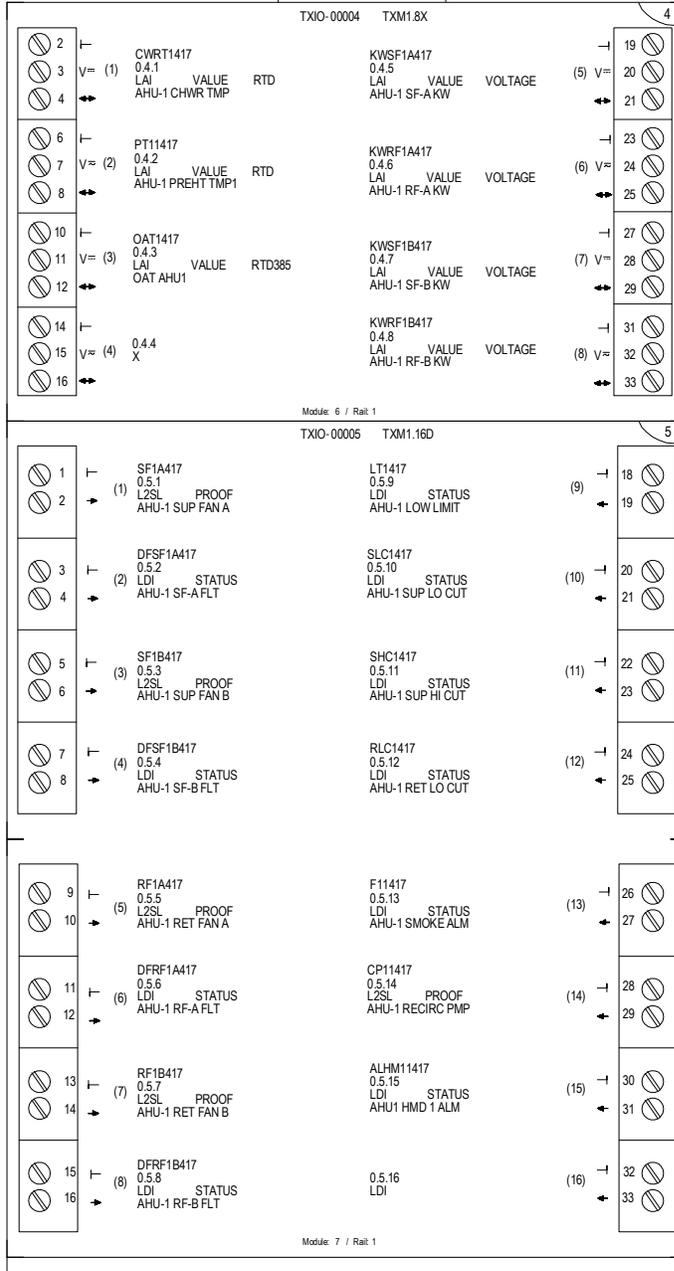
PXCM-1 AHU-1

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PXCM-1 AHU-1p002

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038

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039

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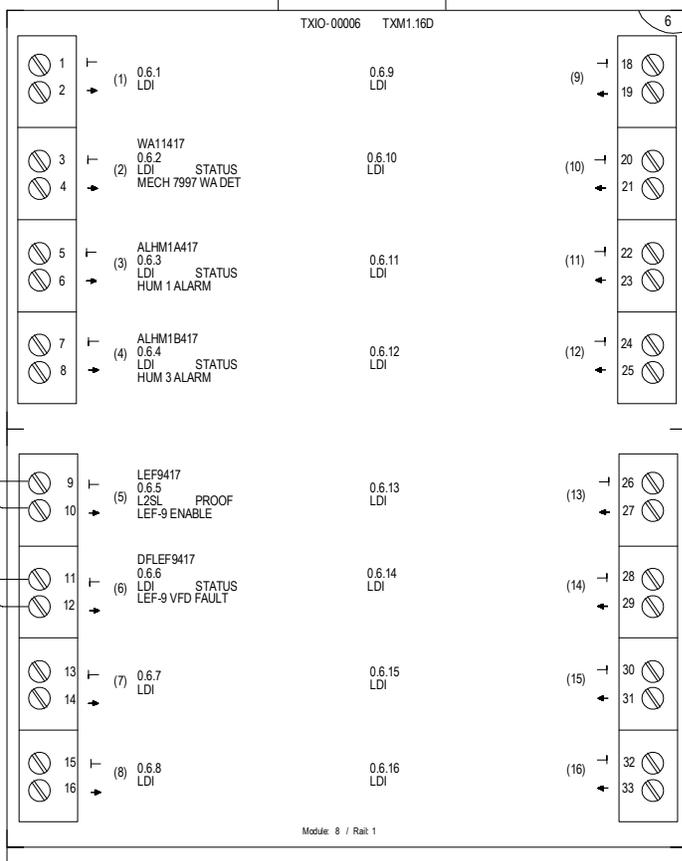
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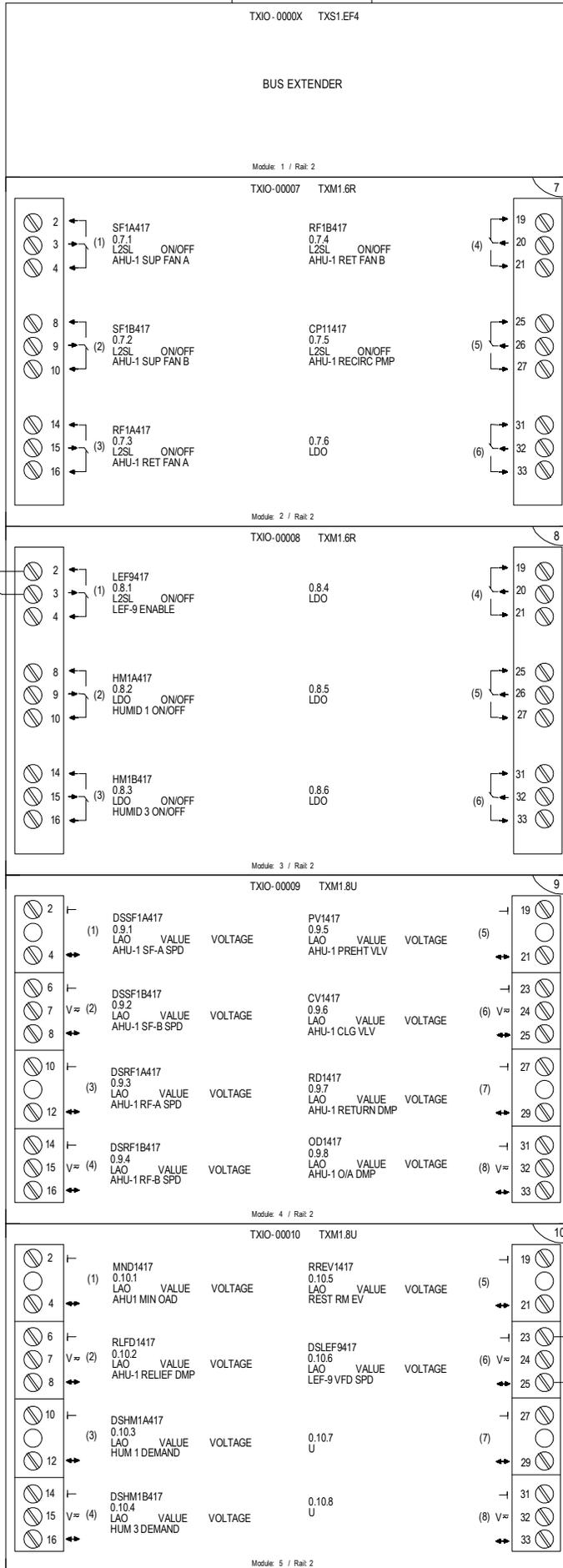
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PXCM-1 AHU-1p004

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040

ADD LEF-4 POINT TO EXISTING PXCM-2 TXIO MODULES AS SHOWN.

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PXCM-2 AHU-2

440P-415245

041

		TXIO-00004		TXM1.8X			
2	—	KWSFA2A417		KWHRC2417		19	—
3	V= (1)	0.4.1	VALUE	0.4.5	VALUE	20	V=
4	↔	LAI SF-A 2A MRT PWR	VOLTAGE	LAI AHU-2 HRC2 KW	VOLTAGE	21	↔
6	—	KWSFB2A417		KWHRC1417		23	—
7	V= (2)	0.4.2	VALUE	0.4.6	VALUE	24	V=
8	↔	LAI SF-B 2A MRT PWR	CURRENT	LAI AHU-2 HRC2 KW	VOLTAGE	25	↔
10	—	KWSFB2B417		KWLEF5417		27	—
11	V= (3)	0.4.3	VALUE	0.4.7	VALUE	28	V=
12	↔	LAI SF-B 2B MRT PWR	VOLTAGE	LAI LEF5 MTR POWER	VOLTAGE	29	↔
14	—	KWSFA2B417		KWLEF7417		31	—
15	V= (4)	0.4.4	VALUE	0.4.8	VALUE	32	V=
16	↔	LAI SF-B 2B MRT PWR	VOLTAGE	LAI LEF7 MTR POWER	VOLTAGE	33	↔

Module: 6 / Rail: 1

		TXIO-00005		TXM1.8X			
2	—	NF2LEF4B417		KWLEF4B417		19	—
3	V= (1)	0.5.1	VALUE	0.5.5	VALUE	20	V=
4	↔	LAI LEF-4B NZL FDK-2	VOLTAGE	LAI LEF4B VFD KWH	VOLTAGE	21	↔
6	—	NF2LEF4A417		EAFLEF4B417		23	—
7	V= (2)	0.5.2	VALUE	0.5.6	VALUE	24	V=
8	↔	LAI LEF-4A NZL FDK-2	VOLTAGE	LAI LEF-4B EXH FLOW	VOLTAGE	25	↔
10	—	NF1LEF4B417		KWLEF4A417		27	—
11	V= (3)	0.5.3	VALUE	0.5.7	VALUE	28	V=
12	↔	LAI LEF-4B NZL FDK-1	VOLTAGE	LAI LEF4A VFD KWH	VOLTAGE	29	↔
14	—	EAFLEF4A417		NF1LEF6A417		31	—
15	V= (4)	0.5.4	VALUE	0.5.8	VALUE	32	V=
16	↔	LAI LEF-4A EXH FLOW	VOLTAGE	LAI LEF6A NZL FDBK	VOLTAGE	33	↔

Module: 7 / Rail: 1

		TXIO-00006		TXM1.8X			
2	—	NF1LEF4A417		NF1LEF6B417		19	—
3	V= (1)	0.6.1	VALUE	0.6.5	VALUE	20	V=
4	↔	LAI LEF-4A NZL FDK-1	VOLTAGE	LAI LEF6B NZL FDBK	VOLTAGE	21	↔
6	—	EAFLEF6A417		NF2LEF6A417		23	—
7	V= (2)	0.6.2	VALUE	0.6.6	VALUE	24	V=
8	↔	LAI LEF6A AIR FLO	VOLTAGE	LAI LEF6A NZL FDBK	VOLTAGE	25	↔
10	—	EAFLEF6B417		NF2LEF6B417		27	—
11	V= (3)	0.6.3	VALUE	0.6.7	VALUE	28	V=
12	↔	LAI LEF6B AIR FLO	VOLTAGE	LAI LEF6B NZL FDBK	VOLTAGE	29	↔
14	—	KWLEF6A417		KWLEF6B417		31	—
15	V= (4)	0.6.4	VALUE	0.6.8	VALUE	32	V=
16	↔	LAI LEF6A MTR POWER	VOLTAGE	LAI LEF6B MTR POWER	VOLTAGE	33	↔

Module: 8 / Rail: 1

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PXCM-2 AHU-2p002

440P-415245

043

TXIO-0000X TXS1.12F4

POWER SUPPLY 24 Volt 4A

Module: 1 / Rail: 2

TXIO-00007 TXM1.8X

2	┌	DP2CHW417 0.7.1 LAI VALUE	CURRENT	KWLEF4C417 0.7.5 LAI VALUE	VOLTAGE	19	┌
3	V=	CHW DP 2 7997		LEF4C MTR PWR		20	┌
4	↔					21	┌
6	┌	NF1LEF4C417 0.7.2 LAI VALUE	VOLTAGE	0.7.6 X		23	┌
7	V=	LEF4C NZL FDBK				24	┌
8	↔					25	┌
10	┌	NF2LEF4C417 0.7.3 LAI VALUE	VOLTAGE	0.7.7 X		27	┌
11	V=	LEF4C NZL FDBK				28	┌
12	↔					29	┌
14	┌	EAFLEF4C417 0.7.4 LAI VALUE	CURRENT	0.7.8 X		31	┌
15	V=	LEF-4C EXH FLOW				32	┌
16	↔					33	┌

Module: 2 / Rail: 2

TXIO-00008 TXM1.16D

1	┌	LTB2417 0.8.1 LDI STATUS		DFSFB2B417 0.8.9 LDI STATUS		18	┌
2	→	AHU-B2 LOW LIMIT		AHU-2B SF-B FLT		19	┌
3	┌	HCPB2417 0.8.2 L2SL PROOF		SFA2A417 0.8.10 L2SL PROOF		20	┌
4	→	AHU-2B RECIRC P		SF-A 2A ENABLE		21	┌
5	┌	HCPA2417 0.8.3 L2SL PROOF		ALLEF1417 0.8.11 LDI STATUS		22	┌
6	→	AHU-2A RECIRC P		LEF-1 VGN ALM		23	┌
7	┌	ALGFS2417 0.8.4 LDI STATUS		SFA2B417 0.8.12 L2SL PROOF		24	┌
8	→	AHU-2 GLYCOL ALM		SF-A 2B ENABLE		25	┌
9	┌	LTA2417 0.8.5 LDI STATUS		SFB2A417 0.8.13 L2SL PROOF		26	┌
10	→	AHU-A2 LOW LIMIT		SF-B 2A ENABLE		27	┌
11	┌	F12417 0.8.6 LDI STATUS		DFSFA2B417 0.8.14 LDI STATUS		28	┌
12	→	AHU-2 SMOKE DET		AHU-2B SF-B FLT		29	┌
13	┌	DFSFB2A417 0.8.7 LDI STATUS		HRCF1417 0.8.15 L2SL PROOF		30	┌
14	→	AHU-2A SF-B FLT		HRC 1 ENABLE		31	┌
15	┌	SFB2B417 0.8.8 L2SL PROOF		DFHRCF1417 0.8.16 LDI STATUS		32	┌
16	→	SF-B 2B ENABLE		AHU-2 HRCF FAULT		33	┌

Module: 3 / Rail: 2

440P-415245

044

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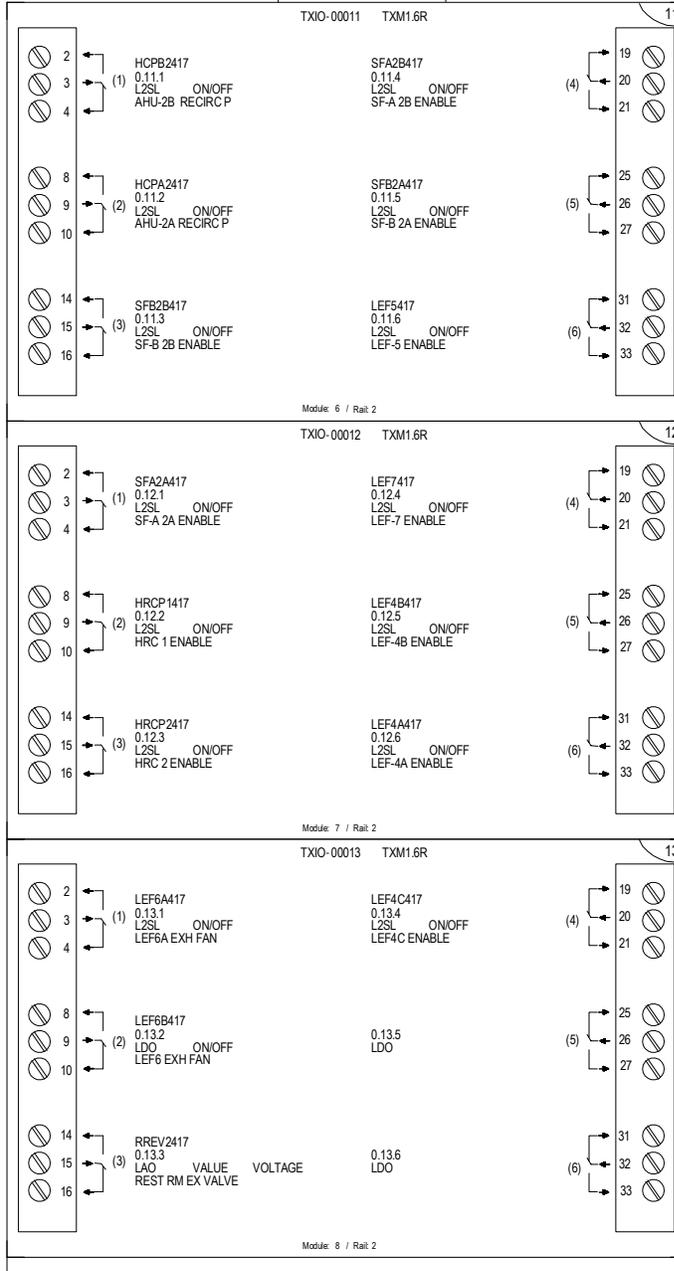
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		TXIO-0009	TXM1.16D		
1	┌	HRCP2417	LEF4A417	18	┐
2	→	(1) 0.9.1 L2SL PROOF HRC 2 ENABLE	0.9.9 L2SL PROOF LEF-4A ENABLE	19	┐
3	┌	DFHRCP2417	LEF4B417	20	┐
4	→	(2) 0.9.2 LDI STATUS AHU-2 HRCP FAULT	0.9.10 L2SL PROOF LEF-4B ENABLE	21	┐
5	┌	GP1417	NCALEF4417	22	┐
6	→	(3) 0.9.3 LDI STATUS GLYCOL STATUS	0.9.11 LDI STATUS NZL ALM LEF4	23	┐
7	┌	GP2417	LEF4C417	24	┐
8	→	(4) 0.9.4 LDI STATUS GLYCOL 2 STATUS	0.9.12 L2SL PROOF LEF4C ENABLE	25	┐
9	┌	LEF5417	DFLEF4A417	26	┐
10	→	(5) 0.9.5 L2SL PROOF LEF-5 ENABLE	0.9.13 LDI STATUS LEF4A VFD FLT	27	┐
11	┌	DFLEF5417	ELCLEF4417	28	┐
12	→	(6) 0.9.6 LDI STATUS LEF-5 VFD FLT	0.9.14 LDI STATUS LEF4 LO CUT	29	┐
13	┌	DFLEF7417	DFLEF4B417	30	┐
14	→	(7) 0.9.7 LDI STATUS LEF7 VFD FAULT	0.9.15 LDI STATUS LEF4B VFD FAULT	31	┐
15	┌	LEF7417	DFLEF4C417	32	┐
16	→	(8) 0.9.8 L2SL PROOF LEF-7 ENABLE	0.9.16 LDI STATUS LEF4C VFD FLT	33	┐
Module: 4 / Rail: 2					
		TXIO-0010	TXM1.16D		
1	┌	DFLEF6A417	0.10.9	18	┐
2	→	(1) 0.10.1 LDI STATUS LEF-6A VFD FAULT	LDI	19	┐
3	┌	ELCLEF6417	0.10.10	20	┐
4	→	(2) 0.10.2 LDI STATUS LEF-6 EXH LO CUT	LDI	21	┐
5	┌	DFLEF6B417	0.10.11	22	┐
6	→	(3) 0.10.3 LDI STATUS LEF-6B VFD FAULT	LDI	23	┐
7	┌	LEF6A417	0.10.12	24	┐
8	→	(4) 0.10.4 L2SL PROOF LEF6A EXH FAN	LDI	25	┐
9	┌	0.10.5	0.10.13	26	┐
10	→	(5) LDI	LDI	27	┐
11	┌	HM2417	0.10.14	28	┐
12	→	(6) 0.10.6 LDI ON/OFF AHU-4 HUM ENABLE	LDI	29	┐
13	┌	NCALEF6417	0.10.15	30	┐
14	→	(7) 0.10.7 LDI STATUS LEFALM LEF6	LDI	31	┐
15	┌	0.10.8	0.10.16	32	┐
16	→	(8) LDI	LDI	33	┐
Module: 5 / Rail: 2					



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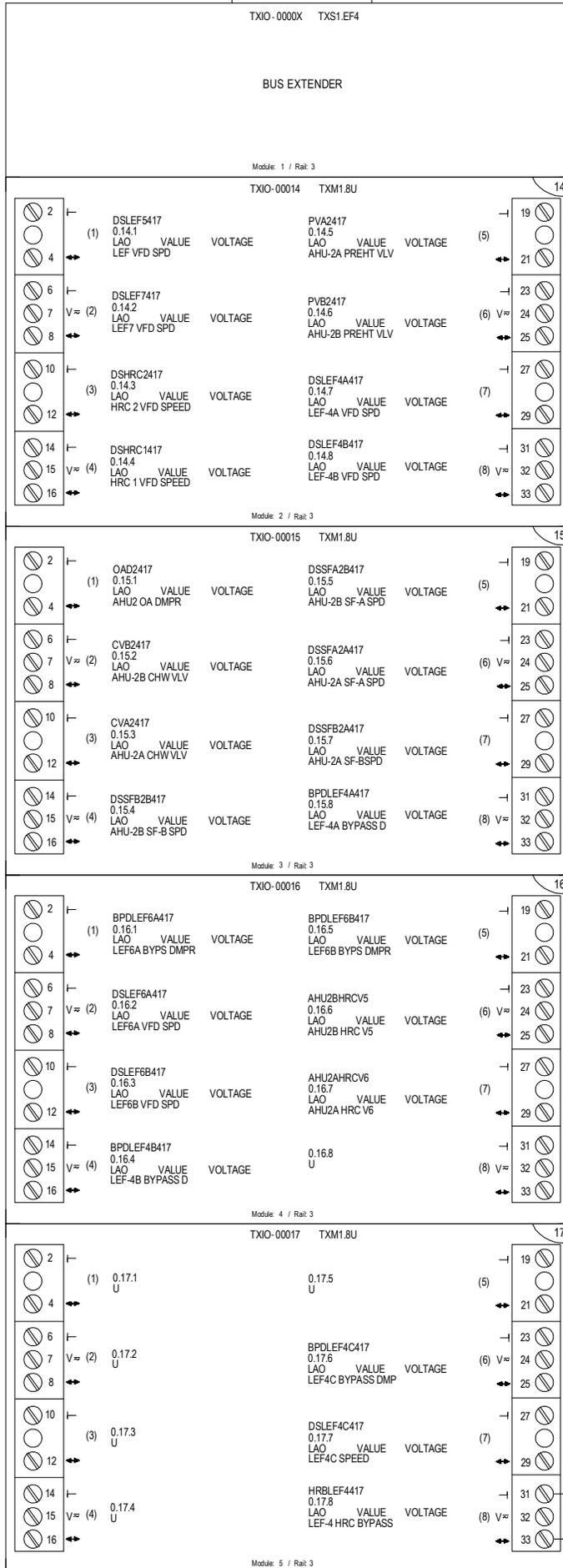
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PXCM-2 AHU-2p005

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046



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047

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ADD LEF-1 POINTS TO EXISTING PXCM-4 TXIO MODULES AS SHOWN.

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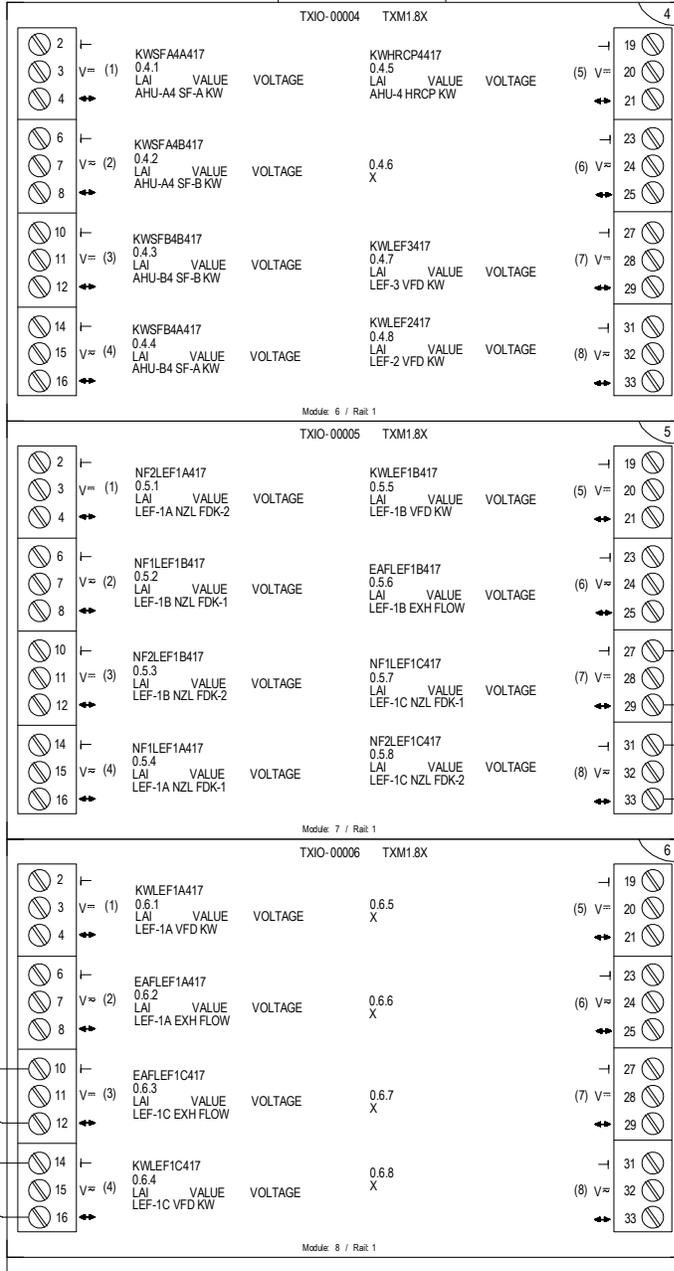
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PXCM-4 AHU-4

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048



LEF-1

LEF-1

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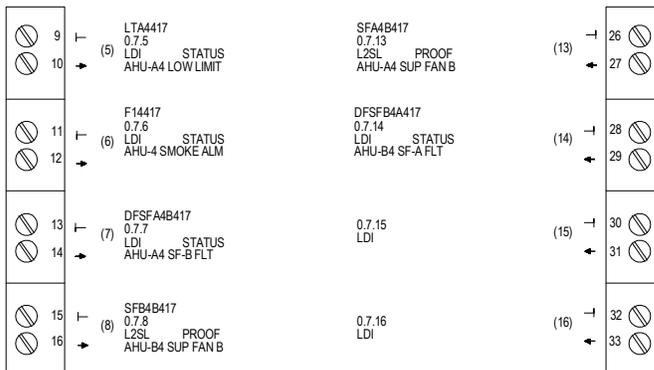
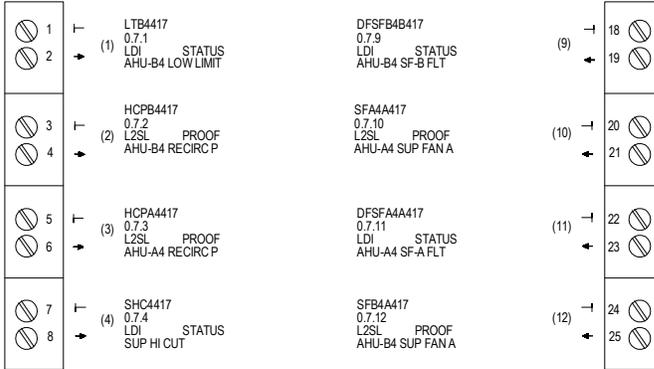
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TXIO-0000X TXS1.12F4

POWER SUPPLY 24 Volt 4A

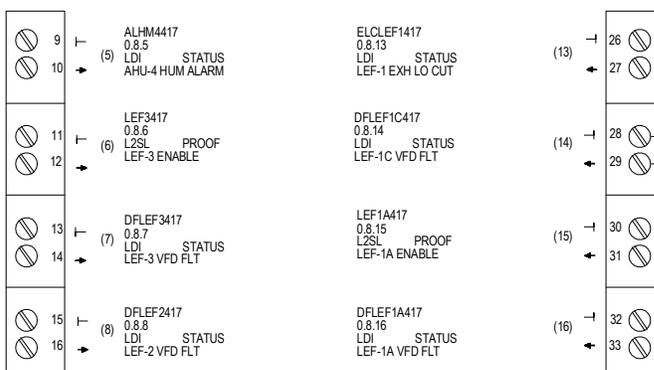
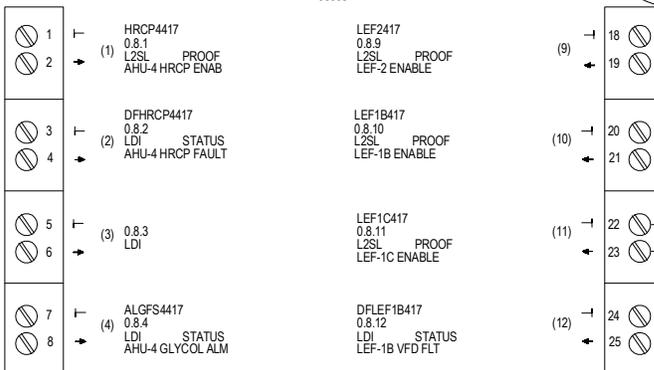
Module: 1 / Rail 2

TXIO-00007 TXM1.16D



Module: 2 / Rail 2

TXIO-00008 TXM1.16D



Module: 3 / Rail 2

440P-415245

051

GEOMETRY - FACULTY 100

IU PROJ #20250961,

ENGINEER	DRAWN	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
WLH	WLH		02/15/19	03/20/28

PXCM-4 AHU-4p003

3502 Woodview Trace
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Smart Infrastructure

REVISION HISTORY

GEOLOGY - FACULTY 100
IU PROJ #20250961,

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
WLH	WLH		02/15/19	03/20/28

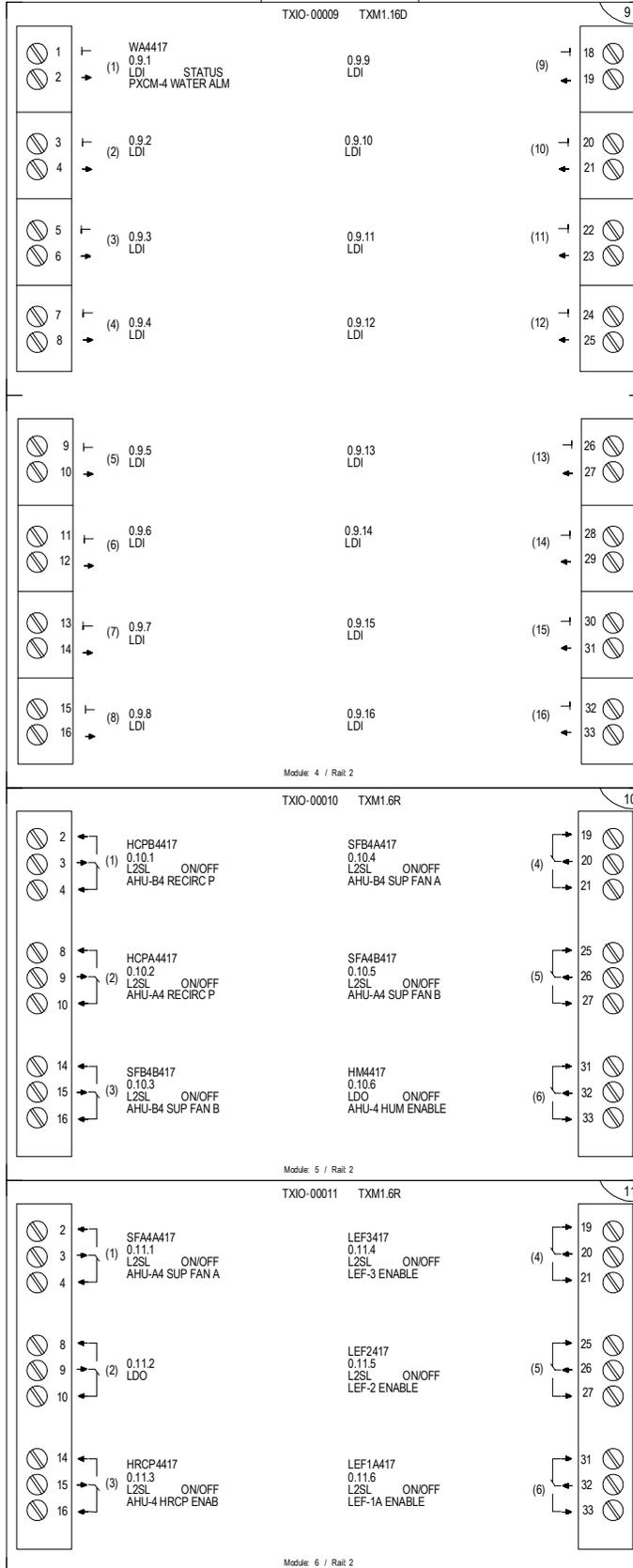
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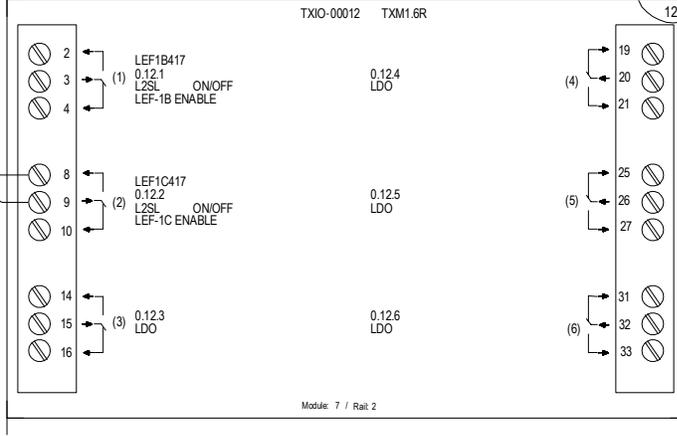
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RIB 6
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REVISION HISTORY

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GEOLOGY - FACULTY 100
IU PROJ #20250861,

ENGINEER	DRAWN	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
WLH	WLH		02/15/19	03/20/28

PXCM-4 AHU-4p005

440P-415245

053

GENERAL NOTES (LEGEND): APPLICABLE TO ALL SHEETS

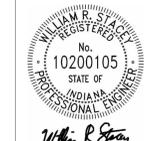
- A. EACH CONTRACTOR, PROPOSER, SUPPLIER AND/OR MANUFACTURER SHALL REFER TO ALL DOCUMENTS PERTAINING TO THIS PROJECT AND COORDINATE ACCORDINGLY SO AS TO ENSURE ADEQUACY OF FIT, COMPLIANCE WITH SPECIFICATIONS, PROPER VOLTAGE AND CURRENT CHARACTERISTICS TO AVOID CONFLICT WITH ANY OTHER BUILDINGS SYSTEMS. VERIFY SAME WITH SHOP DRAWINGS.
- B. ADDITIONAL ELECTRICAL REQUIREMENTS MAY BE SHOWN ON PLANS FROM OTHER DISCIPLINES IN THIS SET. IT IS THE CONTRACTOR'S RESPONSIBILITY TO REVIEW ALL PLANS AND SPECIFICATIONS FOR A COMPLETE UNDERSTANDING OF THE PROJECT REQUIREMENTS.
- C. WORK SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF ALL LOCAL, STATE, AND NATIONAL CODES, INCLUDING BUT NOT LIMITED TO NFPA 70 (NEC), NFPA 72, INTERNATIONAL BUILDING CODES, ETC. IN ADDITION, OBSERVE ALL APPLICABLE RULES AND REGULATIONS THAT MAY APPLY TO THE WORK UNDER THIS CONTRACT FROM CITY, COUNTY, LOCAL, STATE, FEDERAL, MUNICIPALITY, UTILITY COMPANY, OSHA, ETC.
- D. CONTRACTOR SHALL FOLLOW SEISMIC RESTRAINT AND DESIGN REQUIREMENTS CONTAINED IN LATEST ADOPTED STATE AND INTERNATIONAL BUILDING CODES, WITH ALL AMENDMENTS AS ADOPTED BY THE CURRENT LEGISLATION. REFER TO ELECTRICAL AND STRUCTURAL SPECIFICATIONS FOR ADDITIONAL INFORMATION.
- E. ADVISE THE ENGINEER OF ANY CONFLICTS, ERRORS, OMISSIONS, ETC. AT LEAST TEN DAYS PRIOR TO BID DATE, TO ALLOW CLARIFICATION BY WRITTEN ADDENDUM.
- F. WHERE CONFLICTS ARE FOUND BETWEEN DRAWINGS, DETAILS, OR SPECIFICATIONS, THE MORE STRINGENT REQUIREMENT SHALL APPLY. NOTIFY ARCHITECT OF DISCREPANCY IN WRITING.
- G. DEVIATION FROM SPECIFICATIONS OR PLANS REQUIRES PRIOR WRITTEN APPROVAL FROM THE ENGINEERS AND MUST BE SUBMITTED IN WRITING NO LATER THAN TEN DAYS PRIOR TO THE BID DATE.
- H. ALL ELECTRICAL COMPONENTS OR EQUIPMENT SHALL BE LISTED AND LABELED BY UNDERWRITERS' LABORATORIES OR OTHER APPROVED LISTING AGENCY. APPROVAL AND LABELING OF INDIVIDUAL COMPONENTS ON AN ASSEMBLY IS NOT ACCEPTABLE AS MEETING THIS REQUIREMENT, UNLESS WAIVED BY THE ENGINEER IN WRITING.
- I. ALL MATERIALS FURNISHED AND ALL WORK INSTALLED SHALL COMPLY WITH THE CURRENT EDITION OF THE NATIONAL ELECTRICAL CODES, NATIONAL FIRE CODES OF THE NATIONAL FIRE PROTECTION ASSOCIATION, THE REQUIREMENTS OF LOCAL UTILITY COMPANIES, AND WITH THE REQUIREMENTS OF ALL GOVERNMENTAL AGENCIES OR DEPARTMENTS HAVING JURISDICTION. IF ANY CONFLICTS OR DISCREPANCIES OCCUR THE MOST STRINGENT SHALL APPLY.
- J. MOUNTING HEIGHTS FOR WALL MOUNTED DEVICES INDICATED ABOVE FINISHED FLOOR ARE TO CENTER OF DEVICE UNO. MOUNTING HEIGHTS TO CEILING SUSPENDED DEVICES ARE TO BOTTOM OF DEVICE UNO. WHERE MOUNTING HEIGHTS ARE NOT INDICATED OR ARE IN CONFLICT WITH ANY OTHER BUILDING SYSTEM, CONTACT THE ENGINEER BEFORE AFFECTING INTERIOR OR EXTERIOR FINISHES. REFER ALSO TO ARCHITECTURAL INTERIOR AND EXTERIOR ELEVATIONS, CEILING HEIGHTS AND OTHER DETAILS OF THESE DOCUMENTS, AS APPLICABLE.
- K. DO NOT SCALE FROM DRAWINGS, AS PRINTING DISTORTS SCALE. WORK SHALL BE LAID OUT FROM DIMENSIONED DRAWINGS, OR DIMENSIONS SUPPLIED TO THE CONTRACTOR.
- L. REFER TO ARCHITECTURAL WALL ELEVATIONS (WHERE GIVEN) FOR HEIGHTS AND MOUNTING RELATIONSHIP OF OUTLETS AND FURNITURE, CASEWORK, AND/OR EQUIPMENT. ADDITIONAL OUTLETS MAY BE SHOWN ON ARCHITECTURAL DRAWINGS AND SHALL BE INCLUDED IN THE CONTRACT.
- M. FLUSH OR PEDESTAL TYPE FLOOR OUTLETS/BOXES, AS INDICATED ON PLAN, SHALL BE LOCATED BY DIMENSIONS PROVIDED BY THE ARCHITECT, UNLESS OTHERWISE SHOWN ON PLANS. IF IN DOUBT, CONTACT THE ENGINEER PRIOR TO ROUGHING-IN ANY WORK.
- N. INSTALL EQUIPMENT, MATERIALS, ETC. IN STRICT ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND DIRECTIONS. IF IN CONFLICT WITH THE DESIGN INDICATED IN CONTRACT DOCUMENTS, ADVISE THE ENGINEER PRIOR TO INSTALLATION FOR CLARIFICATION.
- O. THE CONSTRUCTION MANAGER, GENERAL CONTRACTOR, OR WHOMEVER HOLDS THE PRIME CONTRACT(S) FOR THIS CONSTRUCTION IS RESPONSIBLE FOR THE COORDINATION, APPEARANCE, SCHEDULING AND TIMELINESS OF THE WORK OF ALL TRADES, CONTRACTORS, SUPPLIERS, INSTALLERS, ETC. POOR OR UNTIMELY WORK ON THE PART OF ANY SUBCONTRACTOR SHALL BE RESOLVED BY THE PARTY WHO ENGAGED THEM ON THIS PROJECT.
- P. THE PURPOSE AND INTENT OF ALL OF THE DOCUMENTS PERTAINING TO THIS PROJECT IS TO PROVIDE A COMPLETE, FUNCTIONAL, SAFE, LIKE-NEW FACILITY. ANYTHING LESS SHALL BE UNACCEPTABLE.
- Q. ALL SYSTEMS, EQUIPMENT AND MATERIALS ARE TO BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. WORK NOT MEETING THIS CRITERION SHALL BE REMOVED AND REINSTALLED SATISFACTORILY. FINAL DETERMINATION OF THE ACCEPTABILITY OF THE QUALITY OF WORK RESIDES WITH THE ENGINEER.
- R. ALL WORK, MATERIALS, EQUIPMENT, ETC. SHALL BE FULLY GUARANTEED FOR ONE FULL CALENDAR YEAR FROM THE DATE OF SUBSTANTIAL COMPLETION AS DOCUMENTED BY THE ENGINEER, UNLESS LONGER WARRANTY PERIODS FOR EQUIPMENT ARE SPECIFIED.
- S. ALL WORK SHALL BE CONCEALED UNLESS SPECIFICALLY INDICATED TO BE EXPOSED, OR REQUIRED TO BE EXPOSED. IF IN DOUBT, CONTACT THE ENGINEER FOR CLARIFICATIONS PRIOR TO INSTALLING ANY SUCH WORK.
- T. UNLESS OTHERWISE SPECIFIED OR INDICATED, ALL EQUIPMENT AND/OR MATERIALS WITHIN OCCUPIED SPACES OR EXPOSED TO VIEW ON THE BUILDING EXTERIOR SHALL BE PRIMED AND FINISHED SO AS TO COMPLEMENT ADJACENT SURFACES UNLESS OTHERWISE NOTED. COORDINATE WORK AND COLORS WITH ARCHITECT.
- U. WHERE PENETRATING ROOFING MEMBRANE OR OTHER MATERIALS USED FOR WEATHERPROOFING THE BUILDING, MAKE SUCH PENETRATION IN A WAY THAT WILL NOT VOID OR DIMINISH THE ROOFING WARRANTY OR INTEGRITY IN ANYWAY. COORDINATE ALL SUCH PENETRATIONS WITH THE ROOFING MANUFACTURER AND ARCHITECT.
- V. CEILING-MOUNTED ELECTRICAL DEVICES SHALL BE CENTERED IN 2'X2' CEILING TILE AND INSTALLED CENTERED ON 2" DIMENSION OF 2'X4" TILE AND ON CENTERLINE OR A QUARTER POINT ON 4" DIMENSION.
- W. PROVIDE DETAILED SHOP DRAWINGS TO ENGINEER PRIOR TO PURCHASING OR INSTALLING ANY EQUIPMENT DEVIATIONS IN SIZES, CAPACITIES, FIT, FINISH, ETC. FOR EQUIPMENT FROM THAT PRIME SPECIFIED SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. ANY PROVISIONS REQUIRED TO ACCORD WITH THE CONTRACTOR'S DEVIATION, WHETHER APPROVED BY THE ENGINEER OR NOT, SHALL BE THE RESPONSIBILITY OF THE PURCHASER.
- X. WHERE FIRE-RATED CEILING ASSEMBLIES ARE NOTED, PROVIDE UL-LISTED FIRE-RATED GYPSUM BOARD OR PRE-MANUFACTURED ENCLOSURES ABOVE LUMINAIRES, CEILING DEVICES, ETC. IN OR ON CEILING, AS REQUIRED TO MAINTAIN CEILING RATINGS.
- Y. DO NOT RECESS PANELBOARD TUBS OR OTHER FLUSH-MOUNTED EQUIPMENT IN WALLS THAT HAVE A FIRE RATING. NO INSTALLATION SHALL DIMINISH OR VOID FIRE RESISTIVE RATINGS IN ANYWAY.
- Z. COORDINATE THE LOCATION OF DRAINS, ELECTRICAL OUTLETS, GAS OUTLETS, ETC. WITH ALL CASEWORK, KITCHEN EQUIPMENT, MECHANICAL ROOM EQUIPMENT, ETC. PRIOR TO COMMENCING INSTALLATION. WORK NOT SO COORDINATED SHALL BE REMOVED AND PROPERLY INSTALLED AT THE EXPENSE OF THE RESPONSIBLE CONTRACTOR(S).
- AA. ALL OFFSETS, TURNS, FITTINGS, TRIM, DETAIL, ETC. MAY NOT BE INDICATED, BUT SHALL BE PROVIDED AS REQUIRED. ADDITIONAL ALLOWANCES SHALL BE INCLUDED FOR SAME AT EACH PROPOSER'S DISCRETION.
- BB. INSTALL NO PIPING, CONDUIT, DUCTWORK, ETC. IN A LOCATION OR IN A MANNER WHICH WILL ALLOW FREEZING OR THE COLLECTION OF CONDENSATION THEREON. IF IN DOUBT, CONTACT THE ENGINEER.
- CC. ALL WIRING SYSTEMS SHALL BE INSTALLED WITH A MINIMUM OF SPLICES. CONDUCTORS, WHETHER SINGLE OR MULTI-PAIR, SHALL BE INSTALLED CONTINUOUS INsofar AS POSSIBLE FROM TERMINAL POINT TO TERMINAL POINT.
- DD. NO CONDUIT, SUPPORTS, ETC. SHALL BE RUN THROUGH ACCESS CLEARANCES OF EQUIPMENT BY OTHER TRADES (I.E. VAV BOXES). COORDINATE WITH ALL TRADES PRIOR TO CONSTRUCTION.
- EE. ALL SUPPORTS FOR EQUIPMENT, DEVICES OR FIXTURES SHALL BE UNIQUE, DIRECTLY FROM THE BUILDING STRUCTURE. DO NOT SUPPORT WORK FROM OTHER TRADES EQUIPMENT OR SUPPORTS WITHOUT WRITTEN PERMISSION FROM THE ENGINEER AND CONSENT OF THE OTHER TRADE, IN WRITING.
- FF. WHERE BACKBOXES ARE LOCATED IN THE SAME VERTICAL CHANNEL/STUD SPACE ON OPPOSITE SIDES OF THE SAME WALL, PROVIDE SOUND-INSULATING PUTTY AROUND BOXES AS REQUIRED TO ELIMINATE SOUND TRANSMISSION FROM ROOM TO ROOM.
- GG. JUNCTION BOXES LOCATED ABOVE ACCESSIBLE CEILINGS SHALL BE LOCATED NO MORE THAN 36" ABOVE CEILING LEVEL. LABEL EACH BOX IN AREA OF WORK WITH A PERMANENT MARKER OR IN ACCORDANCE WITH SPECIFICATIONS, WHICHEVER IS MORE STRINGENT.
- HH. ANY VIBRATING, OSCILLATING OR OTHER NOISE OR MOTION PRODUCING EQUIPMENT SHALL BE ISOLATED FROM SURROUNDING SYSTEMS IN AN APPROVED MANNER. NOISY OR STRUCTURALLY DAMAGING INSTALLATIONS SHALL BE SATISFACTORILY REPLACED OR REPAIRED AT THE INSTALLING CONTRACTORS' EXPENSE. THE FINAL DECISION ON THE SUITABILITY OF A PARTICULAR INSTALLATION'S ACCEPTABILITY SHALL BE THAT OF THE ENGINEER.
- II. CHECK ALL THREE PHASE MOTORS WITH A PHASE ROTATION METER, PRIOR TO PLACING IN SERVICE.
- JJ. ALL ITEMS HAVING KEYPED LOCKS/OPERATORS SHALL HAVE CORED LOCKS/OPERATORS. ALL KEYING SHALL MATCH THE OWNER'S EXISTING KEY-WAYS. COORDINATE EXACT REQUIREMENTS WITH OWNER PRIOR TO CONSTRUCTION.
- KK. NOISY WORK, WORK OUTSIDE CONSTRUCTION BARRIERS, WORK IN OCCUPIED AREAS, ETC. SHALL BE PERFORMED AFTER HOURS OR ON WEEKENDS. COORDINATE EXACT SCHEDULING WITH FACILITY PRIOR TO CONSTRUCTION.
- LL. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING REQUIRED FOR HIS WORK. ALL CUTTING AND PATCHING SHALL BE IN ACCORDANCE WITH THE ARCHITECT'S STANDARDS FOR SUCH WORK.
- MM. THE CONTRACTOR IS RESPONSIBLE FOR ALL UTILITY COMPANY FEES, CASH CONTRIBUTIONS OR OTHER COSTS THAT THE UTILITY COMPANY MAY REQUIRE TO COMPLETE THEIR WORK. (ELECTRIC, TELEPHONE, TELEVISION, DATA, ETC.).
- NN. ALL CONTRACTORS SHALL EXERCISE EXTREME CARE IN THE COURSE OF THEIR WORK SO AS TO ENSURE THAT THEY DO NOT INTERRUPT ANY OTHER SERVICE OR SUB-SERVICE FOR SAFETY PURPOSES. PAY PARTICULAR ATTENTION TO THIS PRECAUTION RELATIVE TO NATURAL GAS AND ELECTRICAL LINES. VERIFY THE LOCATION, SIZE, TYPE, ETC. OF EACH UNDERGROUND OR OVERHEAD UTILITY. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH ALL FEDERAL, STATE AND/OR LOCAL RULES, REGULATIONS, STANDARD AND SAFETY REQUIREMENTS. UTILITIES SHALL BE INSTALLED IN ACCORDANCE WITH THE APPLICABLE MUNICIPALITY OR UTILITY COMPANY STANDARDS. IN ALL CASES, THE MOST STRINGENT REQUIREMENT SHALL APPLY.
- OO. INTERRUPTION OF ANY EXISTING SERVICES SHALL BE COORDINATED WITH THE OWNER, GENERAL CONTRACTOR, UTILITY COMPANY AS NECESSARY, AND THE ARCHITECT, AT LEAST TWO WEEKS IN ADVANCE OF ANTICIPATED INTERRUPTION. A SCHEDULE FOR THESE OUTAGES SHALL BE DEVELOPED AND AGREED UPON BETWEEN THE PARTIES MENTIONED TO AVOID UNNECESSARY INCONVENIENCE TO THE OWNER OR ANY AFFECTED PARTY. NOTIFY THE UTILITY COMPANY OF ANY ANTICIPATED SERVICES REQUIRED TWO WEEKS IN ADVANCE, IN WRITING. IF UTILITY COMPANY REQUIRES A LONGER NOTIFICATION PERIOD, SO PROVIDE.
- PP. WHERE INTERRUPTING AN EXISTING UTILITY OR SERVICE DELIBERATELY OR ACCIDENTALLY, THE RESPONSIBLE CONTRACTOR SHALL WORK CONTINUOUSLY AS NEEDED TO RESTORE SAME, PROVIDING PREMIUM TIME AS NEEDED.
- QQ. AS APPLICABLE, REFER TO ARCHITECTURAL PHASING PLANS AND PHASING BOUNDARIES ON THESE DRAWINGS FOR SEQUENCING OF WORK, FULL EXTENT OF AREAS INVOLVED, EXTENT OF CEILING WORK, ETC. PROVIDE TEMPORARY CONNECTIONS FOR CIRCUITS AND WORK AS REQUIRED TO MAINTAIN SEQUENCE OF THE WORK FROM PHASE TO PHASE. PROVIDE ALL REQUIRED INCREMENTAL INSPECTIONS, CERTIFICATIONS, ETC. AND ALL TEMPORARY SERVICES AS REQUIRED BY OWNER TO ACCOMPLISH THE PHASING PLAN.

DESCRIPTION	MOUNTING HEIGHT (TO CENTER OF BOX)	DRAWING SYMBOL	DESCRIPTION	MOUNTING HEIGHT (TO CENTER OF BOX)	DRAWING SYMBOL	DESCRIPTION	MOUNTING HEIGHT (TO CENTER OF BOX)	DRAWING SYMBOL
SWITCHES			LIGHTING			ABBREVIATIONS		
LIGHT SWITCH-GENERAL PURPOSE	46"	\$	REFER TO LUMINAIRE SCHEDULE FOR EXACT FIXTURE SPECIFICATIONS. MOUNTING HEIGHTS, ETC.			UNLESS OTHERWISE NOTED		UCN
DIMMER SWITCH	46"	\$ D	SURFACE OR SUSPENDED CEILING FIXTURE (SLASH INDICATES RECESSED)			OWNER FURNISHED CONTRACTOR INSTALLED		OFCI
THREE-WAY SWITCH	46"	\$ 3	WALL MOUNT FIXTURE			OWNER FURNISHED OWNER INSTALLED		OFUI
FOUR-WAY SWITCH	46"	\$ 4	EXIT LIGHT (CEILING, END, WALL MOUNT)			CONTRACTOR FURNISHED CONTRACTOR INSTALLED		CFCI
KEYED SWITCH	46"	\$ K	STRIP FIXTURE			CONTRACTOR FURNISHED OWNER INSTALLED		CFUI
OCCUPANCY OR VACANCY SENSOR SWITCH	46"	\$ OS, \$ VS	PARALLEL-HATCHING INDICATES LIGHT IS POWERED FROM THE EMERGENCY-LIFE SAFETY BRANCH			INDICATES EMERGENCY POWER		EM
LIGHT SWITCH FOR UNDER-CABINET LIGHTS	46"	\$ U						
LOW VOLTAGE MOMENTARY SWITCH	46"	\$ LV						
NON-REVERSING MOTOR STARTER SNAP SWITCH	AS NOTED	\$ M	MISCELLANEOUS			SPECIAL OUTLETS		
TIMER SWITCH	46"	\$ T	CONDUIT CONCEALED IN WALLS OR IN CEILING SPACE. ARROWS INDICATES HOME RUN & # OF CIRCUITS. HASHMARKS INDICATE # OF CONDUCTORS. DASHED LINE INDICATES CONDUIT BELOW FLOOR.			FLOORBOX, POWER ONLY, AS SCHEDULED	FLOOR	FB
OCCUPANCY OR VACANCY SENSOR, CEILING MOUNT	CLG	OS VS	DISCONNECT SWITCH	9'-0"		FLOORBOX, COMBINATION POWER AND LOW VOLTAGE, REFER TO FLOORBOX SCHEDULE	FLOOR	FB
EMERGENCY AUTOMATIC TRANSFER SWITCH FOR LIGHTING CONTROLS (REFER TO DETAIL)		EM				FIRE RATED POKE-THRU FLOOR BOX, COORDINATE EXACT COVER REQUIREMENTS WITH ARCHITECTURAL FINISHES. DEVICES AS SCHEDULED	FLOOR	FB
POWER OUTLETS						AUDIOVISUAL SYSTEM OUTLET WITH DUPLEX RECEPTACLE. REFER TO ASSOCIATED DETAIL FOR ADDITIONAL INFORMATION	1'-6"	AV
SIMPLEX RECEPTACLE	1'-6"	S				COMBINATION POWER AND DATA OUTLET LOCATION, REFER TO ASSOCIATED DETAIL FOR ADDITIONAL INFORMATION	1'-6"	AV
DUPLEX RECEPTACLE-SAFETY TYPE, TAMPER-RESISTANT	1'-6"	S				COMBINATION POWER AND DATA OUTLET LOCATION, REFER TO ASSOCIATED DETAIL FOR ADDITIONAL INFORMATION	1'-6"	AV
DUPLEX RECEPTACLE	1'-6"	S				FLEXIBLE CONDUIT		
SLASH THROUGH ANY DEVICE INDICATES MOUNTING ABOVE COUNTERTOP & ABOVE BACKSPASH, OR AT 46" WHERE NO COUNTER IS PRESENT						OVERHEAD PROJECTOR, PROVIDE DUPLEX RECEPTACLE, ONE DATA, HDMI, 3mm AUDIO, AND VSA OUTLET PLATES	CLG	CLG
FILLED CENTER BAR INDICATES INTEGRAL GROUND FAULT PROTECTION (GFCI)	1'-6"					SURFACE PLUG-MOLD		LLLU
DEAD FRONT GFCI DEVICE. LABEL AND INSTALL IN READILY ACCESSIBLE LOCATION						SURFACE WIRE-MOLD		LLLU
DUPLEX RECEPTACLE, CEILING MOUNTED	CLG					POWER POLE AS NOTED		PP
QUADRUPLX RECEPTACLE	1'-6"							
JUNCTION BOX, CEILING OR WALL						TELEVISION		
VOLTAGE/PH RECEPTACLE, AS NOTED	AS NOTED					TELEVISION SPLITTERS/AMPLIFIERS/DISTRIBUTION	46"	TV-HB
VOLTAGE/3PH RECEPTACLE, AS NOTED	1'-6"					TELEVISION SYSTEM OUTLET WITH DUPLEX RECEPTACLE. COORDINATE LOCATION WITH WALL BRACKET WHERE APPLICABLE	7'-0"	TV-HB
FIRE ALARM								
MAIN CONTROL PANEL CENTRAL PROCESSING UNIT (CPU)	9'-6" TO TOP	FA-CP						
PULL STATION - DOUBLE ACTION	46" TO LEVER	F						
KEYED, LOCKED PULL STATION - DOUBLE ACTION. STATION SHALL ONLY BE OPERABLE VIA KEY IN POSSESSION OF STAFF.	46" TO LEVER	F K						
AUDIOVISUAL NOTIFICATION APPLIANCE	WALL, CLG	F A						
AUDIO-ONLY NOTIFICATION APPLIANCE	WALL, CLG	F A						
VISUAL-ONLY NOTIFICATION APPLIANCE	WALL, CLG	F V						
PHOTO-ELECTRIC SMOKE DETECTOR	CLG	SD						
HEAT DETECTOR	CLG	HD						
CARBON MONOXIDE DUCT DETECTOR	ABV CLG	CD						
CARBON MONOXIDE ALARM - SINGLE STATION W/SQUIGGLE BASE	CLG	CM						
CARBON MONOXIDE AUDIOVISUAL NOTIFICATION APPLIANCE	WALL	F A CM						
DOOR HOLDER - WALL TYPE	WALL	DH						
DOOR HOLDER - CLOSURE TYPE	ABV DOOR	DH C						
DUCT SMOKE DETECTOR	ABV CLG	DD						
CONNECTION TO SPRINKLER FLOW SWITCH WITH ADDRESSABLE MODULE		FS						
CONNECTION TO SPRINKLER TAMPER SWITCH WITH ADDRESSABLE MODULE		TS						
PRESSURE SWITCH		PS						
REMOTE L.C.D. FIRE ALARM ANNUNCIATOR	54"	FAA						
REMOTE FIRE ALARM ANNUNCIATOR W/ MICROPHONE	54"	FAAM						
POST INDICATOR VALVE		PIV						
POWER SUPPLY/CONTROL FOR AUDIOVISUAL DEVICES	46"	NAC						
TRANSPONDER CABINET	46"	TRCN						
GRAPHICS DISPLAY TERMINAL		GDT						
FIRE ALARM CONTROL EXTENDER		EXT						
ISOLATION MODULE	WALL	I						
ZONE ADDRESSABLE MODULE		Z						
H.V.A.C. SMOKE DAMPER CONNECTION		SM						
FLUSH MOUNTED REMOTE ALARM INDICATING STATION/TEST SWITCH	7'-6"	RI						
ADDRESSABLE RELAY MODULE		R						

1 ELECTRICAL LEGEND
NO SCALE

EQUIP ID	DESCRIPTION	DISCONNECT MEANS	VOLTAGE	POLES	HP	POWER (KVA)
CLH-4	CABINET UNIT HEATER	PROVIDED W/ UNIT	120	1	1/4	0.25
EF-9	EXHAUST FAN	VFD/DISCONNECT BY MC	480	3	1	1.70
LEF-1C	EXHAUST FAN	VFD/DISCONNECT BY MC	480	3	15	14.00

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DATE: 03 MAR 2025
SCALE: 1" = 1'-0"
DRAWING: 10200105
PROJECT: 3242226 3.27-04 PM
REVISIONS: 3 Addendum 3 (03/24/2025)



3242226 3.27-04 PM
REVISIONS
3 Addendum 3 (03/24/2025)

ELECTRICAL LEGEND & GENERAL NOTES E001

BL 417 GEOLOGY - FACILITY 100 INDIANA UNIVERSITY BLOOMINGTON: BL417 GEOLOGICAL SCIENCES BL417: 1001 E. 10TH STREET BLOOMINGTON, IN 47405

CONSTRUCTION DOCUMENTS

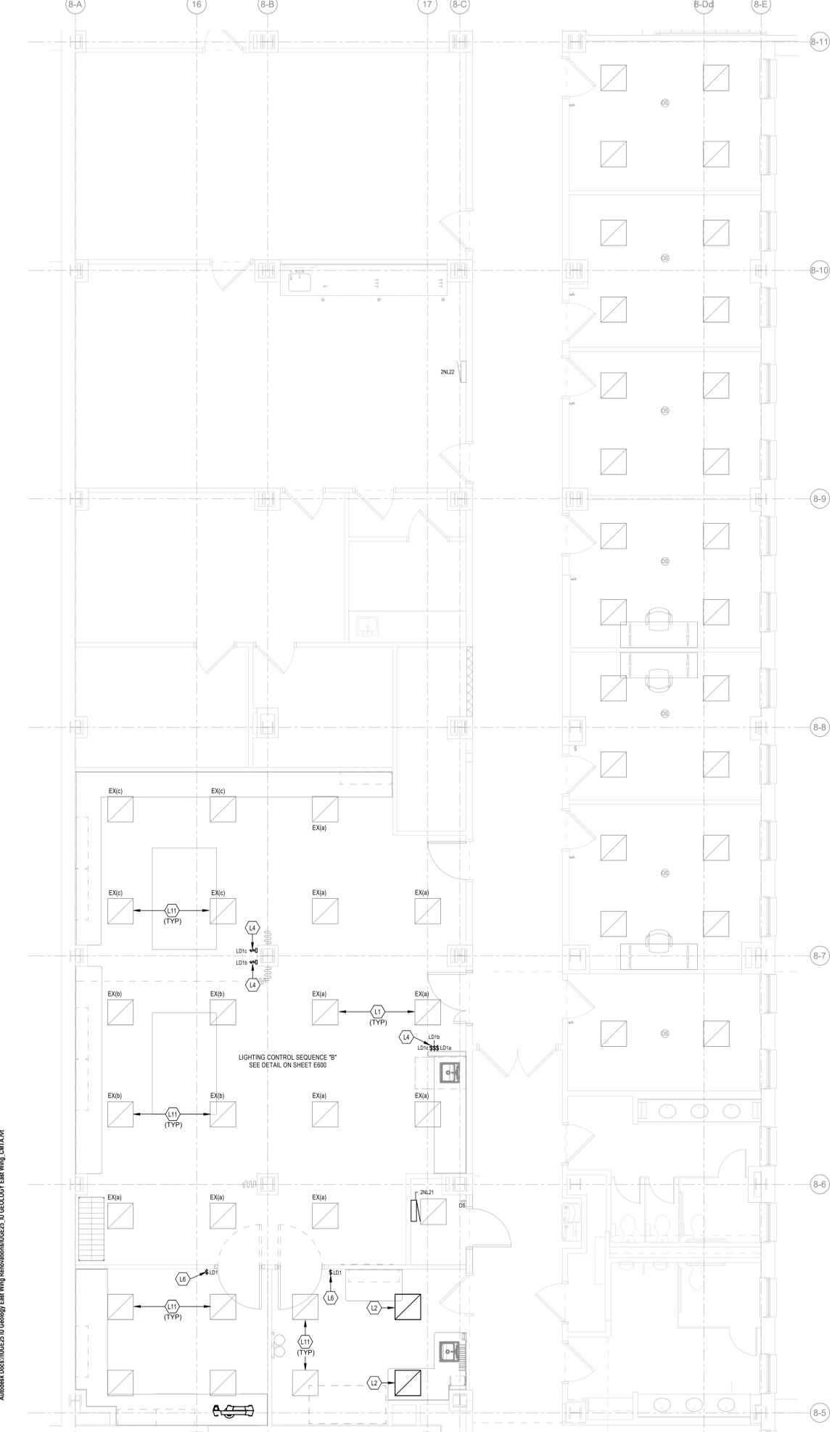


ELECTRICAL LEGEND & GENERAL NOTES E001

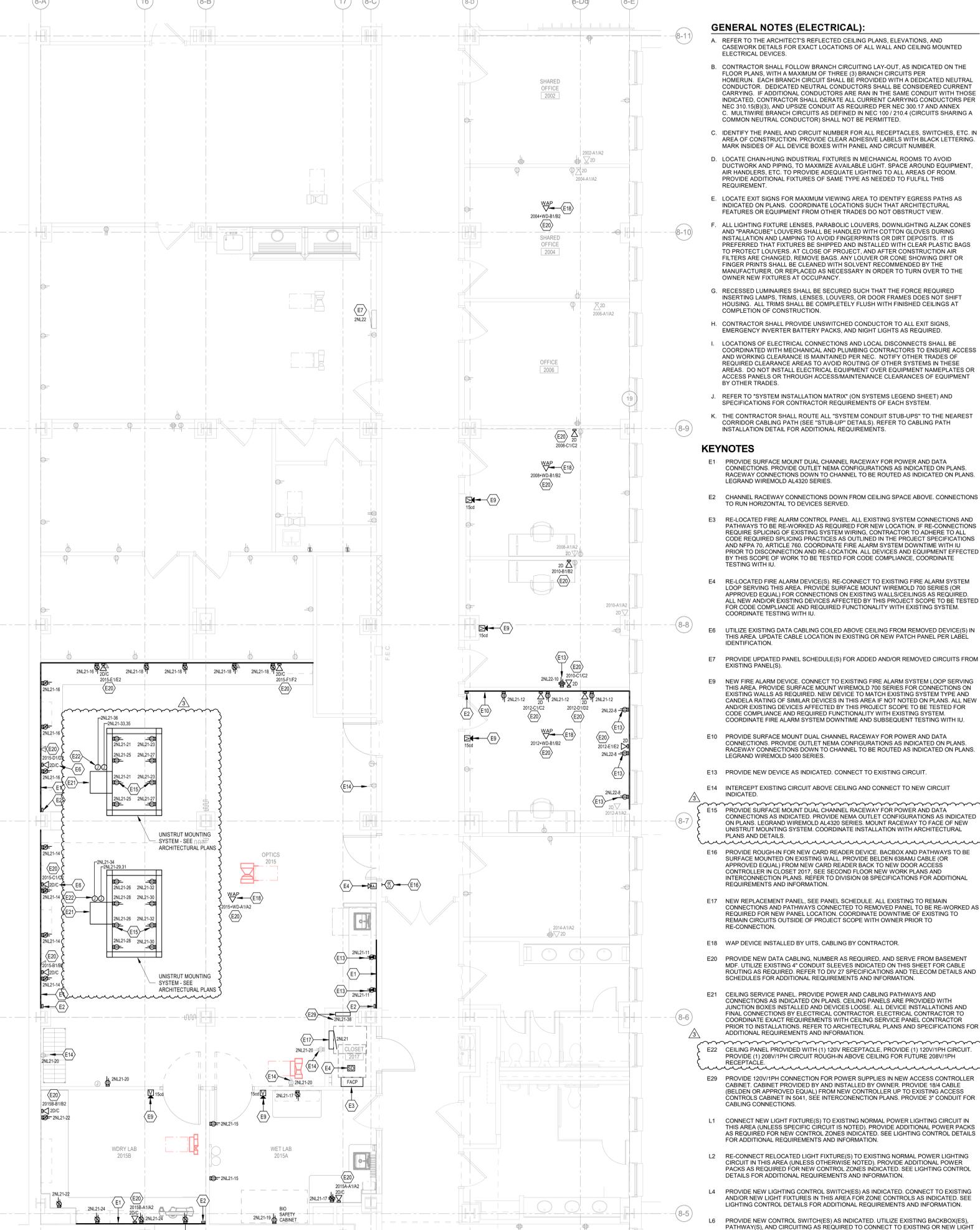
BL 417 GEOLOGY - FACILITY 100 INDIANA UNIVERSITY BLOOMINGTON: BL417 GEOLOGICAL SCIENCES BL417: 1001 E. 10TH STREET BLOOMINGTON, IN 47405

3 Addendum 3 (03/24/2025)

3 Addendum 3 (



1 SECOND FLOOR NORTHEAST LIGHTING PLAN
SCALE: 1/4" = 1'-0"



2 SECOND FLOOR NORTHEAST POWER/SYSTEMS PLAN
SCALE: 1/4" = 1'-0"

- GENERAL NOTES (ELECTRICAL):**
- A. REFER TO THE ARCHITECT'S REFLECTED CEILING PLANS, ELEVATIONS, AND CASEWORK DETAILS FOR EXACT LOCATIONS OF ALL WALL AND CEILING MOUNTED ELECTRICAL DEVICES.
 - B. CONTRACTOR SHALL FOLLOW BRANCH CIRCUITING LAY-OUT, AS INDICATED ON THE FLOOR PLANS, WITH A MAXIMUM OF THREE (3) BRANCH CIRCUITS PER HOMERUN. EACH BRANCH CIRCUIT SHALL BE PROVIDED WITH A DEDICATED NEUTRAL CONDUCTOR. DEDICATED NEUTRAL CONDUCTORS SHALL BE CONSIDERED CURRENT CARRYING. IF ADDITIONAL CONDUCTORS ARE RUN IN THE SAME CONDUIT WITH THOSE INDICATED, CONTRACTOR SHALL DERATE ALL CURRENT CARRYING CONDUCTORS PER NEC 310.15(B)(10), AND UPSIZE CONDUIT AS REQUIRED PER NEC 300.17 AND ANNEX C. MULTIWIRE BRANCH CIRCUITS AS DEFINED IN NEC 100.210.4 (CIRCUITS SHARING A COMMON NEUTRAL CONDUCTOR) SHALL NOT BE PERMITTED.
 - C. IDENTIFY THE PANEL AND CIRCUIT NUMBER FOR ALL RECEPTACLES, SWITCHES, ETC. IN AREA OF CONSTRUCTION. PROVIDE CLEAR ADHESIVE LABELS WITH BLACK LETTERING. MARK INSIDES OF ALL DEVICE BOXES WITH PANEL AND CIRCUIT NUMBER.
 - D. LOCATE CHAIN-HUNG INDUSTRIAL FIXTURES IN MECHANICAL ROOMS TO AVOID DUCTWORK AND PIPING. TO MAXIMIZE AVAILABLE LIGHT, SPACE AROUND EQUIPMENT, AIR HANDLERS, ETC. TO PROVIDE ADEQUATE LIGHTING TO ALL AREAS OF ROOM. PROVIDE ADDITIONAL FIXTURES OF SAME TYPE AS NEEDED TO FULFILL THIS REQUIREMENT.
 - E. LOCATE EXIT SIGNS FOR MAXIMUM VIEWING AREA TO IDENTIFY EGRESS PATHS AS INDICATED ON PLANS. COORDINATE LOCATIONS SUCH THAT ARCHITECTURAL FEATURES OR EQUIPMENT FROM OTHER TRADES DO NOT OBSTRUCT VIEW.
 - F. ALL LIGHTING FIXTURE LENSES, PARABOLIC LOUVERS, DOWNLIGHTING ALZAK CONES AND "PARACUBE" LOUVERS SHALL BE HANDLED WITH COTTON GLOVES DURING INSTALLATION AND LAMPING TO AVOID FINGERPRINTS OR DIRT DEPOSITS. IT IS PREFERRED THAT FIXTURES BE SHIPPED AND INSTALLED WITH CLEAN PLASTIC BAGS TO PROTECT LOUVERS. AT CLOSE OF PROJECT, AND AFTER CONSTRUCTION AIR FILTERS ARE CHANGED, REMOVE BAGS. ANY LOUVER OR CONE SHOWING DIRT OR FINGER PRINTS SHALL BE CLEANED WITH SOLVENT RECOMMENDED BY THE MANUFACTURER, OR REPLACED AS NECESSARY IN ORDER TO TURN OVER TO THE OWNER NEW FIXTURES AT OCCUPANCY.
 - G. RECESSED LUMINAIRES SHALL BE SECURED SUCH THAT THE FORCE REQUIRED INSERTING LAMPS, TRIMS, LENSES, LOUVERS, OR DOOR FRAMES DOES NOT SHIFT HOUSING. ALL TRIMS SHALL BE COMPLETELY FLUSH WITH FINISHED CEILING AT COMPLETION OF CONSTRUCTION.
 - H. CONTRACTOR SHALL PROVIDE UNSWITCHED CONDUCTOR TO ALL EXIT SIGNS, EMERGENCY INVERTER BATTERY PACKS, AND NIGHT LIGHTS AS REQUIRED.
 - I. LOCATIONS OF ELECTRICAL CONNECTIONS AND LOCAL DISCONNECTS SHALL BE COORDINATED WITH MECHANICAL AND PLUMBING CONTRACTORS TO ENSURE ACCESS AND WORKING CLEARANCE IS MAINTAINED PER NEC. NOTIFY OTHER TRADES OF REQUIRED CLEARANCE AREAS TO AVOID ROUTING OF OTHER SYSTEMS IN THESE AREAS. DO NOT INSTALL ELECTRICAL EQUIPMENT OVER EQUIPMENT NAMEPLATES OR ACCESS PANELS OR THROUGH ACCESS/MAINTENANCE CLEARANCES OF EQUIPMENT BY OTHER TRADES.
 - J. REFER TO "SYSTEM INSTALLATION MATRIX" (ON SYSTEMS LEGEND SHEET) AND SPECIFICATIONS FOR CONTRACTOR REQUIREMENTS OF EACH SYSTEM.
 - K. THE CONTRACTOR SHALL ROUTE ALL "SYSTEM CONDUIT STUB-UPS" TO THE NEAREST CORRIDOR CABLING PATH (SEE "STUB-UP" DETAILS). REFER TO CABLING PATH INSTALLATION DETAIL FOR ADDITIONAL REQUIREMENTS.

- KEYNOTES**
- E1 PROVIDE SURFACE MOUNT DUAL CHANNEL RACEWAY FOR POWER AND DATA CONNECTIONS. PROVIDE OUTLET NEMA CONFIGURATIONS AS INDICATED ON PLANS. RACEWAY CONNECTIONS DOWN TO CHANNEL TO BE ROUTED AS INDICATED ON PLANS. LEGRAND WIREMOLD AL4320 SERIES.
 - E2 CHANNEL RACEWAY CONNECTIONS DOWN FROM CEILING SPACE ABOVE. CONNECTIONS TO RUN HORIZONTAL TO DEVICES SERVED.
 - E3 RE-LOCATED FIRE ALARM CONTROL PANEL. ALL EXISTING SYSTEM CONNECTIONS AND PATHWAYS TO BE RE-WORKED AS REQUIRED FOR NEW LOCATION. IF RE-CONNECTIONS REQUIRE SPlicing OF EXISTING SYSTEM WIRING, CONTRACTOR TO ADHERE TO ALL CODE REQUIRED SPlicing PRACTICES AS OUTLINED IN THE PROJECT SPECIFICATIONS AND NFPA 70, ARTICLE 760. COORDINATE FIRE ALARM SYSTEM DOWNTIME WITH IU PRIOR TO DISCONNECTION AND RE-LOCATION OF ALL DEVICES AND EQUIPMENT AFFECTED BY THIS SCOPE OF WORK TO BE TESTED FOR CODE COMPLIANCE. COORDINATE TESTING WITH IU.
 - E4 RE-LOCATED FIRE ALARM DEVICES. RE-CONNECT TO EXISTING FIRE ALARM SYSTEM LOOP SERVING THIS AREA. PROVIDE SURFACE MOUNT WIREMOLD 700 SERIES (OR APPROVED EQUAL) FOR CONNECTIONS ON EXISTING WALLS/CEILING AS REQUIRED. ALL NEW AND/OR EXISTING DEVICES AFFECTED BY THIS PROJECT SCOPE TO BE TESTED FOR CODE COMPLIANCE AND REQUIRED FUNCTIONALITY WITH EXISTING SYSTEM. COORDINATE TESTING WITH IU.
 - E6 UTILIZE EXISTING DATA CABLING COILED ABOVE CEILING FROM REMOVED DEVICES IN THIS AREA. UPDATE CABLE LOCATION IN EXISTING OR NEW PATCH PANEL PER LABEL IDENTIFICATION.
 - E7 PROVIDE UPDATED PANEL SCHEDULE(S) FOR ADDED AND/OR REMOVED CIRCUITS FROM EXISTING PANEL(S).
 - E9 NEW FIRE ALARM DEVICE. CONNECT TO EXISTING FIRE ALARM SYSTEM LOOP SERVING THIS AREA. PROVIDE SURFACE MOUNT WIREMOLD 700 SERIES FOR CONNECTIONS ON EXISTING WALLS AS REQUIRED. NEW DEVICE TO MATCH EXISTING SYSTEM TYPE AND CANDLEA RATINGS OR SIMILAR DEVICES IN THIS AREA. IF NOT NOTED ON PLANS, ALL NEW AND/OR EXISTING DEVICES AFFECTED BY THIS PROJECT SCOPE TO BE TESTED FOR CODE COMPLIANCE AND REQUIRED FUNCTIONALITY WITH EXISTING SYSTEM. COORDINATE FIRE ALARM SYSTEM DOWNTIME AND SUBSEQUENT TESTING WITH IU.
 - E10 PROVIDE SURFACE MOUNT DUAL CHANNEL RACEWAY FOR POWER AND DATA CONNECTIONS. PROVIDE OUTLET NEMA CONFIGURATIONS AS INDICATED ON PLANS. RACEWAY CONNECTIONS DOWN TO CHANNEL TO BE ROUTED AS INDICATED ON PLANS. LEGRAND WIREMOLD 5400 SERIES.
 - E13 PROVIDE NEW DEVICE AS INDICATED. CONNECT TO EXISTING CIRCUIT.
 - E14 INTERCEPT EXISTING CIRCUIT ABOVE CEILING AND CONNECT TO NEW CIRCUIT INDICATED.
 - E15 PROVIDE SURFACE MOUNT DUAL CHANNEL RACEWAY FOR POWER AND DATA CONNECTIONS AS INDICATED. PROVIDE NEMA OUTLET CONFIGURATIONS AS INDICATED ON PLANS. LEGRAND WIREMOLD AL4320 SERIES. MOUNT RACEWAY TO FACE OF NEW UNISTRUT MOUNTING SYSTEM. COORDINATE INSTALLATION WITH ARCHITECTURAL PLANS AND DETAILS.
 - E16 PROVIDE ROUGH-IN FOR NEW CARD READER DEVICE. BACKBOX AND PATHWAYS TO BE SURFACE MOUNTED ON EXISTING WALL. PROVIDE BELDEN 6384M CABLE (OR APPROVED EQUAL) FROM NEW CARD READER BACK TO NEW DOOR ACCESS CONTROLLER IN CLOSET 2017. SEE SECOND FLOOR NEW WORK PLANS AND INTERCONNECTION PLANS. REFER TO DIVISION 08 SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS AND INFORMATION.
 - E17 NEW REPLACEMENT PANEL. SEE PANEL SCHEDULE. ALL EXISTING TO REMAIN CONNECTIONS AND PATHWAYS CONNECTED TO REMOVED PANEL TO BE RE-WORKED AS REQUIRED FOR NEW PANEL LOCATION. COORDINATE DOWNTIME OF EXISTING TO REMAIN CIRCUITS OUTSIDE OF PROJECT SCOPE WITH OWNER PRIOR TO RE-CONNECTION.
 - E18 WAP DEVICE INSTALLED BY UITS. CABLING BY CONTRACTOR.
 - E20 PROVIDE NEW DATA CABLING. NUMBER AS REQUIRED. AND SERVE FROM BASEMENT MDF. UTILIZE EXISTING 4" CONDUIT SLEEVES INDICATED ON THIS SHEET FOR CABLE ROUTING AS REQUIRED. REFER TO DIV 27 SPECIFICATIONS AND TELECOM DETAILS AND SCHEDULES FOR ADDITIONAL REQUIREMENTS AND INFORMATION.
 - E21 CEILING SERVICE PANEL. PROVIDE POWER AND CABLING PATHWAYS AND CONNECTIONS AS INDICATED ON PLANS. CEILING PANELS ARE PROVIDED WITH JUNCTION BOXES INSTALLED AND ALL DEVICES INSTALLATIONS AND FINAL CONNECTIONS BY ELECTRICAL CONTRACTOR. ELECTRICAL CONTRACTOR TO COORDINATE EXACT REQUIREMENTS WITH CEILING SERVICE PANEL CONTRACTOR PRIOR TO INSTALLATION. REFER TO ARCHITECTURAL PLANS AND SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS AND INFORMATION.
 - E22 CEILING PANEL PROVIDED WITH (1) 120V RECEPTACLE, PROVIDE (1) 120V/1PH CIRCUIT. PROVIDE (1) 200V/1PH CIRCUIT. PROVIDE ROUGH-IN ABOVE CEILING FOR FUTURE 200V/1PH RECEPTACLE.
 - E29 PROVIDE 120V/1PH CONNECTION FOR POWER SUPPLIES IN NEW ACCESS CONTROLLER CABINET. CABINET PROVIDED BY AND INSTALLED BY OWNER. PROVIDE B4 CABLE (BELDEN OR APPROVED EQUAL) FROM NEW CONTROLLER UP TO EXISTING ACCESS CONTROLS CABINET IN 5041. SEE INTERCONNECTION PLANS. PROVIDE 3" CONDUIT FOR CABLING CONNECTIONS.
 - L1 CONNECT NEW LIGHT FIXTURE(S) TO EXISTING NORMAL POWER LIGHTING CIRCUIT IN THIS AREA (UNLESS SPECIFIC CIRCUIT IS NOTED). PROVIDE ADDITIONAL POWER PACKS AS REQUIRED FOR NEW CONTROL ZONES INDICATED. SEE LIGHTING CONTROL DETAILS FOR ADDITIONAL REQUIREMENTS AND INFORMATION.
 - L2 RE-CONNECT RELOCATED LIGHT FIXTURE(S) TO EXISTING NORMAL POWER LIGHTING CIRCUIT IN THIS AREA (UNLESS OTHERWISE NOTED). PROVIDE ADDITIONAL POWER PACKS AS REQUIRED FOR NEW CONTROL ZONES INDICATED. SEE LIGHTING CONTROL DETAILS FOR ADDITIONAL REQUIREMENTS AND INFORMATION.
 - L4 PROVIDE NEW LIGHTING CONTROL SWITCHES AS INDICATED. CONNECT TO EXISTING AND/OR NEW LIGHT FIXTURES IN THIS AREA FOR ZONE CONTROLS AS INDICATED. SEE LIGHTING CONTROL DETAILS FOR ADDITIONAL REQUIREMENTS AND INFORMATION.
 - L6 PROVIDE NEW CONTROL SWITCHES AS INDICATED. UTILIZE EXISTING BACKBOX(ES), PATHWAYS, AND CIRCUITING AS REQUIRED TO CONNECT TO EXISTING OR NEW LIGHT FIXTURE(S) AND ZONE(S) INDICATED. SEE LIGHTING CONTROL DETAILS FOR ADDITIONAL REQUIREMENTS AND INFORMATION.
 - L11 PROVIDE ADDITIONAL 0-10V DIMMING CONDUCTORS AS REQUIRED FOR NEW CONTROL DEVICE(S) INDICATED IN THIS AREA.

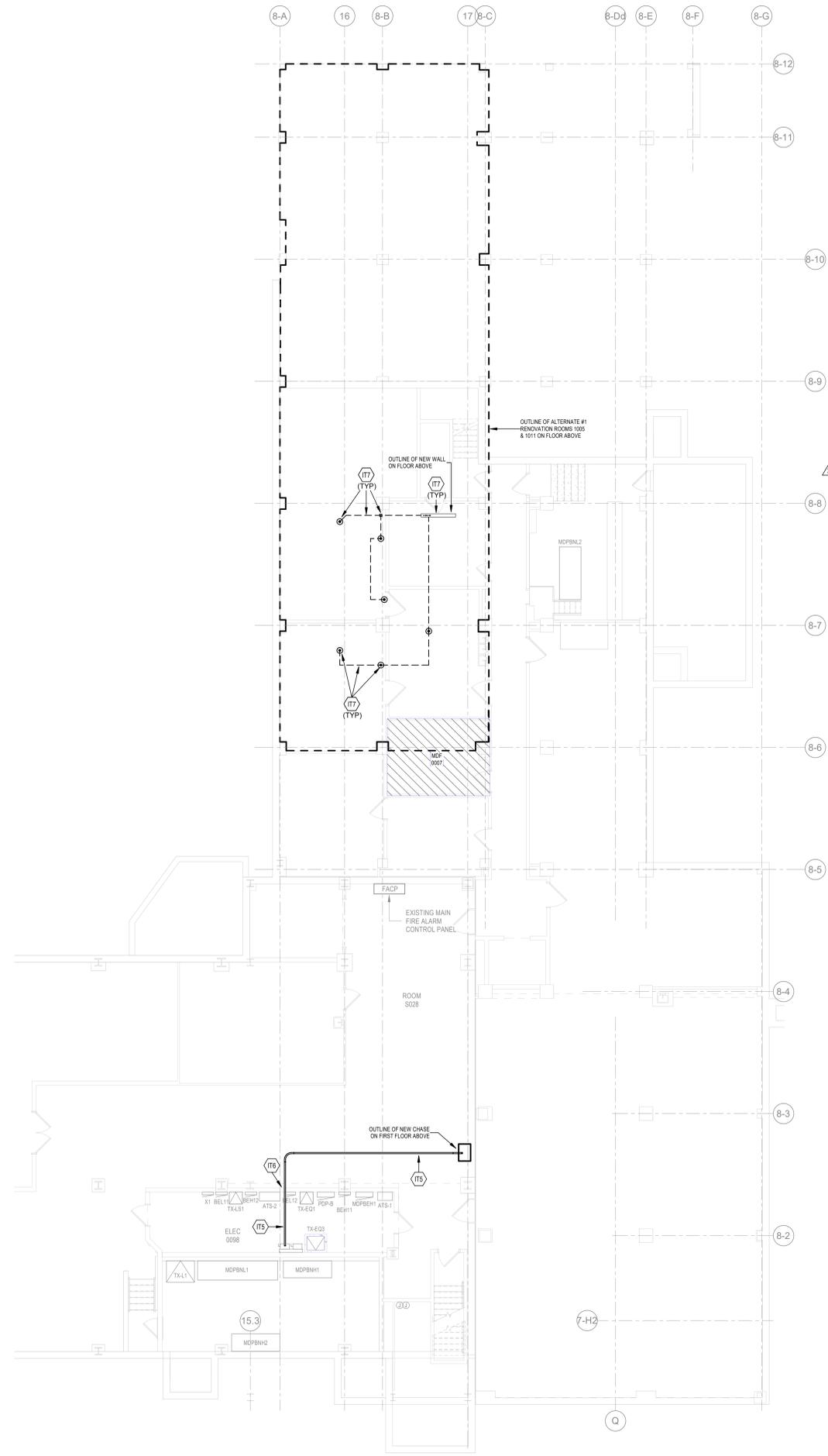
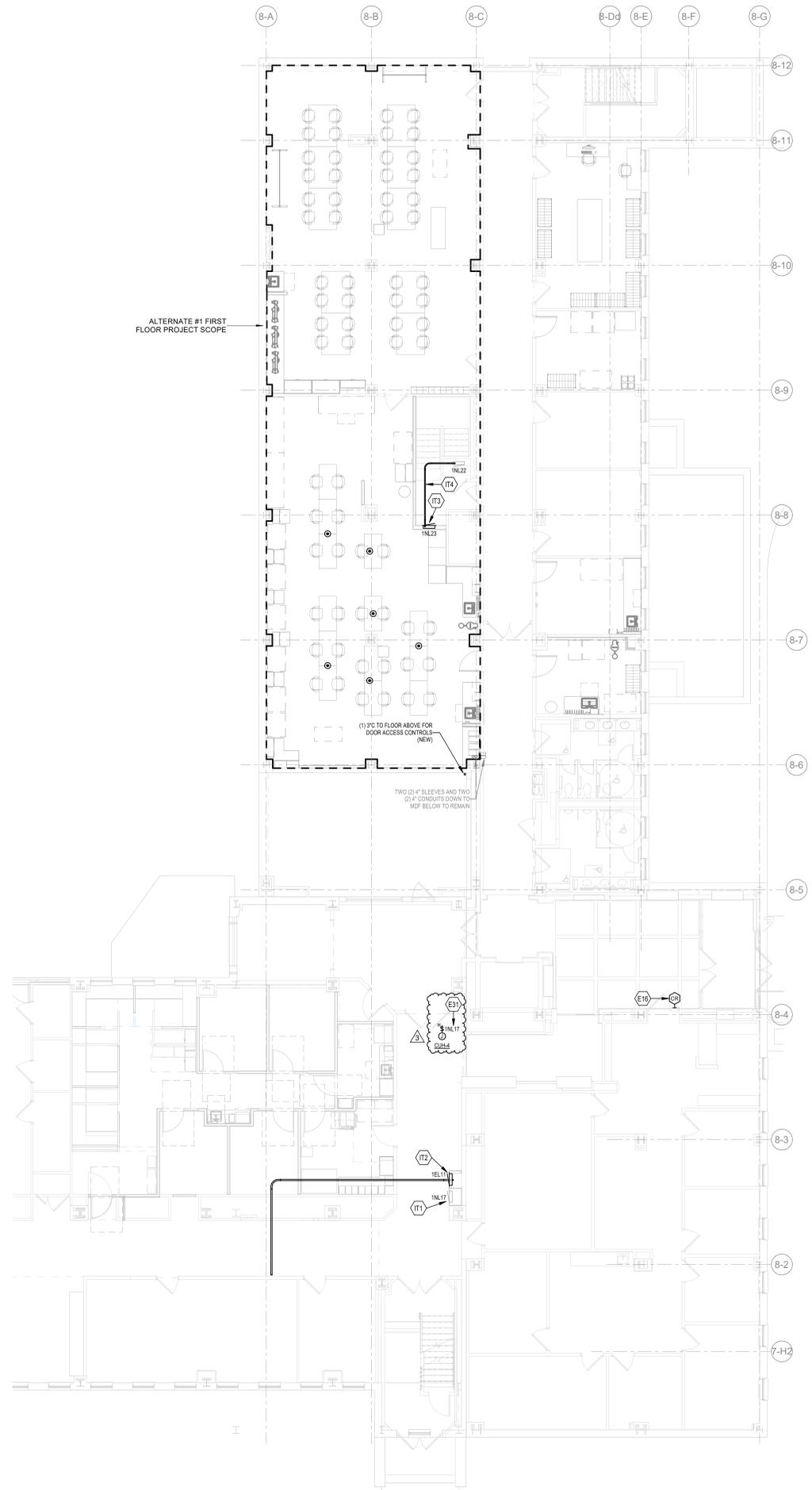
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2 Addendum 2 03/22/2025
3 Addendum 3 02/24/2025

BL 417 GEOLOGY - FACILITY 100
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CONSTRUCTION DOCUMENTS



SECOND FLOOR - EAST WING - ELECTRICAL PLANS E202



- GENERAL NOTES (INTERCONNECTION):**
- THE CONTRACTOR SHALL VISIT SITE AND VERIFY THAT PULL BOXES AND CONDUITS MAY BE INSTALLED AS INDICATED. IF THERE IS A CONFLICT, CONTRACTOR SHALL NOTIFY ENGINEER 10 DAYS PRIOR TO BID. NO PRICE CHANGE WILL BE GIVEN FOR ANY ALTERNATE ROUTINGS OF CONDUIT AFTER THE CONTRACT HAS BEEN AWARDED. NOTIFY FACILITY ENGINEER AT LEAST 24 HOURS IN ADVANCE OF ANY VISIT.
 - ALL NEW WORK SHALL BE HUNG FROM STRUCTURE, NOT FROM THE WORK OF OTHER TRADES (WHETHER EXISTING OR NEW).
 - COORDINATE ALL WORK WITH ARCHITECTURAL/MECHANICAL PHASING AND APPROPRIATE FACILITY STAFF. WORK IN CERTAIN AREAS SHALL BE DONE ON WEEKENDS AND/OR AT NIGHT. COORDINATE ALL REQUIREMENTS WITH ARCHITECT/OWNER PRIOR TO BID.
 - COORDINATE ALL WORK WITH ARCHITECTURAL/MECHANICAL PHASING AND APPROPRIATE FACILITY STAFF. WORK IN CERTAIN AREAS SHALL BE DONE ON WEEKENDS AND/OR AT NIGHT. COORDINATE ALL REQUIREMENTS WITH ARCHITECT/OWNER PRIOR TO BID.
 - PROVIDE UL LISTED PENETRATIONS TO MATCH RATING OF WALL/FLOOR ASSEMBLY.
 - OPEN CABLING PATHWAYS ARE NOT PERMITTED ABOVE INACCESSIBLE CEILING OR IN AREAS WITH NO CEILING UNLESS OTHERWISE NOTED. PROVIDE RACEWAY FROM OUTLET BOX TO CABLE TRAY OR ACCESSIBLE CEILING.
 - COORDINATE EXACT LOCATION OF ALL SLEEVES SO THEY ARE INSTALLED ABOVE CABLE TRAYS.
 - REMOVE AND RE-INSTALL ALL CEILING TILES, HARD CEILINGS, AND/OR GRID MEMBERS AS NECESSARY TO PERFORM WORK REQUIRED. TO ENSURE NEW REPLACEMENT CEILING TILES MATCH EXISTING TILES IN AREA, THE CONTRACTOR SHALL REMOVE TILES FROM DESIGNATED ROOM(S) AND USE THESE TO REPLACE DAMAGED CEILING TILES. ALL NEW CEILING TILES SHALL BE INSTALLED IN "DESIGNATED" ROOM(S) AT CLOSE OF PROJECT. COORDINATE "DESIGNATED" ROOM(S) WITH FACILITY ENGINEER. REPLACE TILES WITH NEW IF ACCEPTABLE TO OWNER.
- KEYNOTES**
- PROVIDE ROUGH-IN FOR NEW CARD READER DEVICE. BACBOX AND PATHWAYS TO BE SURFACE MOUNTED ON EXISTING WALL. PROVIDE BELDEN 638AMJ CABLE (OR APPROVED EQUAL) FROM NEW CARD READER BACK TO NEW DOOR ACCESS CONTROLLER IN CLOSET 2017. SEE SECOND FLOOR NEW WORK PLANS AND INTERCONNECTION PLANS. REFER TO DIVISION 08 SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS AND INFORMATION.
 - PROVIDE TWO (2) #12 AND ONE (1) #12 GROUND IN 3/4" CONDUIT FOR NEW POWER CONNECTION. ROUTE TO NEW/SPARE 20A/1P BREAKER IN EXISTING PANEL INDICATED. CUT, PATCH, AND REPAIR EXISTING WALLS AS REQUIRED FOR CONNECTION TO PANEL. ROUTE THROUGH MANUFACTURER'S INTEGRAL DISCONNECT SWITCH.
 - EXISTING PANEL TO REMAIN.
 - AS PART OF ALTERNATE #1: PROVIDE NEW EMERGENCY ELECTRICAL PANEL "1EL11" TO BE INSTALLED RECESSED IN NEW CORRIDOR CHASE. SEE PANEL SCHEDULE FOR ADDITIONAL REQUIREMENTS AND INFORMATION. REFER TO ARCHITECTURAL PLANS FOR CHASE CONSTRUCTION. NEW CHASE TO MATCH WIDTH AND SIZE OF EXISTING CHASE IN SAME AREA.
 - AS PART OF ALTERNATE #1: PROVIDE NEW NORMAL POWER ELECTRICAL PANEL "1NL23". RECESS IN NEW WALL CONSTRUCTION. SEE PANEL SCHEDULE FOR ADDITIONAL REQUIREMENTS AND INFORMATION.
 - AS PART OF ALTERNATE #1: PROPOSED ROUTE FOR NEW FEED FOR ELECTRICAL PANEL "1NL23" FROM NEW 100A/3P IN EXISTING PANEL "1NL22". CONTRACTOR TO FIELD VERIFY BEST ROUTE PRIOR TO CONSTRUCTION. SEE PANEL SCHEDULES AND ELECTRICAL ONE-LINE DIAGRAM FOR ADDITIONAL REQUIREMENTS AND INFORMATION.
 - AS PART OF ALTERNATE #1: PROPOSED ROUTE FOR NEW FEED FOR ELECTRICAL PANEL "1EL11" FROM EXISTING 200A DISCONNECT IN BASEMENT ELECTRICAL ROOM 0086. PROVIDE FOUR (4) #10, ONE (1) #6 GROUND, IN 2" CONDUIT. CONTRACTOR TO FIELD VERIFY BEST ROUTE PRIOR TO CONSTRUCTION. SEE PANEL SCHEDULES FOR ADDITIONAL REQUIREMENTS AND INFORMATION.
 - AS PART OF ALTERNATE #1: PATCH AND REPAIR ALL WALLS FOR CONDUIT PENETRATIONS AS REQUIRED. MAINTAIN EXISTING FIRE RATINGS. REFER TO SLEEVE PENETRATION DETAIL FOR ADDITIONAL REQUIREMENTS AND INFORMATION.
 - AS PART OF ALTERNATE #1: PROPOSED LOCATION FOR POKE-THRU/US SERVING FIXED FURNITURE ON FLOOR ABOVE. FINAL LOCATIONS TO BE COORDINATED WITH OWNER'S FINAL FURNITURE SELECTIONS PRIOR TO CORE DRILLING OR INSTALLATION. PROPOSED ROUTING OF 3/4" AND 1-1/4" CONDUITS SHOWN FOR POWER AND DATA ARE DIAGRAMMATICAL ONLY. CONTRACTOR TO FIELD VERIFY EXACT ROUTING WHEN FINAL LOCATIONS ARE DETERMINED. CONDUITS TO ROUTE UP IN NEW WALL ON FLOOR ABOVE AS INDICATED FOR CONNECTION TO PANEL "1NL23". PROVIDE NUMBER OF JUNCTION BOXES FOR CONDUIT ROUTINGS AS REQUIRED. SEE DETAIL ON E400 AND FLOORBOX SCHEDULE FOR ADDITIONAL REQUIREMENTS AND INFORMATION.

DATE: 03 MAR 2024
 SCALE: 1/8" = 1'-0"
 PROJECT: BL 417 GEOLGY EAST WING RENOVATION/UPGRADE
 DRAWING: E300
 SHEET: 1 OF 14
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REVISIONS

2	Addendum 2	03/22/2024
3	Addendum 3	03/24/2024

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CONSTRUCTION DOCUMENTS



PARTIAL INTERCONNECTION PLANS - BASEMENT & FIRST FLOOR
E300

1 PARTIAL FIRST FLOOR INTERCONNECTION PLAN
 SCALE: 1/8" = 1'-0"

2 PARTIAL BASEMENT FLOOR INTERCONNECTION PLAN
 SCALE: 1/8" = 1'-0"

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